

CLAIMS

1. A computer-implemented system for delivery scheduling from a fulfillment center, the system comprising:
 - at least one of sensors or cameras associated with a fulfillment center, the sensors or cameras being associated with zones within the fulfillment center and configured to collect tracking information of product locations within the associated fulfillment center;
 - a memory storing instructions; and
 - at least one processor coupled to the at least one of sensors or cameras, and configured to execute the instructions to perform operations comprising:
 - maintaining a first data structure comprising elements representing the zones and associating the zones with:
 - physical locations within the fulfillment center, and
 - a cutoff time for delivery, before a first time period, for products in the plurality of physical locations;
 - maintaining, according to the tracking information, a second data structure comprising a mapping between the zones and product identifiers;
 - receiving a request to provide a delivery time estimate associated with a requested product;
 - searching the second data structure to identify at least one zone in the fulfillment center carrying the requested product;
 - searching the first data structure to determine cutoff times associated with the at least one zone; and
 - returning, responsive to the request, a first cutoff time selected from the cutoff times, the first cutoff time being selected by computing a delivery estimate

based on a distance of the at least one zone to a packing center, the first cutoff time being associated with a faster delivery estimate than other cutoff times.

2. The system of claim 1, wherein the operations further comprise:
 - receiving, responsive to searching the second data structure, a plurality of zones;
 - searching the first data structure for each of the plurality of zones to determine a plurality of cutoff times; and
 - selecting one of the plurality of zones based on a comparison between a current time and respective cutoff times.
3. The system of claim 1, wherein:
 - the request is received from a system for displaying web pages to a customer device; and
 - the operations further comprise sending the first cutoff time to the system for displaying web pages.
4. The system of claim 1, wherein the operations further comprise:
 - receiving, from a first device, a first scan event comprising an identifier associated with a first physical location stored in the first data structure;
 - receiving, from a second device, a second scan event comprising a product identifier associated with the requested product;
 - determining a time period based on the first scan event and the second scan event; and
 - modifying, based on the determined time period, the cutoff time associated with a zone associated with the first physical location in the first data structure.
5. The system of claim 4, wherein modifying the cutoff time comprises:

analyzing a plurality of first scan events and a plurality of second scan events; and

calculating a distance between packaging centers and the zones based on the plurality of first scan events and the plurality of second scan events.

6. The system of claim 5, wherein each cutoff time is inversely proportional to respective ones of the calculated distance for each of the associated zones.
7. The system of claim 1, wherein the zones are associated with shelf locations or pallet locations inside the fulfillment center.
8. The system of claim 7, wherein
 - the sensors comprise optical or wireless tags, and
 - the optical or wireless tags are associated with a physical location identifier stored in the first data structure.
9. The system of claim 1, wherein:
 - the first data structure is stored in a first database;
 - the second data structure is stored in a second database different from the first database; and
 - the second database is stored in a server within the fulfillment center.
10. A computer-implemented method for delivery scheduling from a fulfillment center, the method comprising:
 - maintaining a first data structure comprising elements representing zones within a fulfillment center and associating the zones with:
 - physical locations within the fulfillment center, and
 - a cutoff time for delivery, before a first time period, for products in the plurality of physical locations;

collecting tracking information of product locations within the fulfillment center from at least one of sensors or cameras associated with the fulfillment center and the zones;

maintaining, according to the tracking information, a second data structure comprising a mapping between the zones and product identifiers;

receiving a request to provide a delivery time estimate associated with a requested product;

searching the second data structure to identify at least one zone in the fulfillment center carrying the requested product;

searching the first data structure to determine cutoff times associated with the at least one zone; and

returning, responsive to the request, a first cutoff time selected from the cutoff times, the first cutoff time being selected by computing a delivery estimate based on a distance of the at least one zone to a packing center, the first cutoff time being associated with a faster delivery estimate than other cutoff times.

11. The method of claim 10 further comprising:
 - receiving, responsive to searching the second data structure, a plurality of zones;
 - searching the first data structure for each of the plurality of zones to determine a plurality of cutoff times; and
 - selecting one of the plurality of zones based on a comparison between a current time and respective cutoff times.
12. The method of claim 10, wherein:
 - the request is received from a system for displaying web pages to a customer device; and
 - the method further comprises sending the first cutoff time to the system for displaying web pages.

13. The method of claim 10 further comprising:
 - receiving, from a first device, a first scan event comprising an identifier associated with a first physical location stored in the first data structure;
 - receiving, from a second device, a second scan event comprising a product identifier associated with the requested product;
 - determining a time period based on the first scan event and the second scan event; and
 - modifying, based on the determined time period, the cutoff time associated with a zone associated with the first physical location in the first data structure.
14. The method of claim 13, wherein modifying the cutoff time comprises:
 - analyzing a plurality of first scan events and a plurality of second scan events; and
 - calculating a distance between packaging centers and the zones based on the plurality of first scan events and the plurality of second scan events.
15. The method of claim 14, wherein each cutoff time is inversely proportional to respective ones of the calculated distance for each of the associated zones.
16. The method of claim 10, wherein the zones are associated with shelf locations or pallet locations inside the fulfillment center.
17. The method of claim 16, wherein
 - the sensors comprise optical or wireless tags, and
 - the optical or wireless tags are associated with a physical location identifier stored in the first data structure.

18. A non-transitory computer-readable medium storing instructions that, when executed by a processor, perform operations for delivery scheduling from a fulfillment center, the operations comprising:
- maintaining a first data structure comprising elements representing zones within a fulfillment center and associating the zones with:
 - physical locations within the fulfillment center, and
 - a cutoff time for delivery, before a first time period, for products in the plurality of physical locations;
 - collecting tracking information of product locations within the fulfillment center from at least one of sensors or cameras associated with the zones;
 - maintaining, according to the tracking information, a second data structure comprising a mapping between the zones and product identifiers;
 - receiving a request to provide a delivery time estimate associated with a requested product;
 - searching the second data structure to identify at least one zone in the fulfillment center carrying the requested product;
 - searching the first data structure to determine cutoff times associated with the at least one zone; and
 - returning, responsive to the request, a first cutoff time selected from the cutoff times, the first cutoff time being selected by computing a delivery estimate based on a distance of the at least one zone to a packing center, the first cutoff time being associated with a faster delivery estimate than other cutoff times.