CSCI 234 – Software Engineering

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Project Initial User Requirements

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Client is the Schaper Sandwich Shop. There is currently one location of this business. The client is considering starting a delivery service in order to keep up with competitors. The client wants to franchise their business. The client also wants to dominate the sandwich business. To do so, it is believed that rather than create a traditional delivery service, it would be better to put the entire sandwich shop in a truck and have the truck drive to customer houses to deliver sandwiches. A sandwich truck will have the entire ability of a brick-and-mortar store.

The client wants to also update their menu. The client has specialty sandwiches that their customers love. They will also determine the best (most desirable) menu based on customer surveys. The menu must contain sandwiches that can be prepared in the limited space of the truck.

The basic operation of a truck will be as follows:

* Customer places an order by phone or on a website.
* The address of the customer is used to determine the route the truck will follow. This route is updated each time an order is placed. Routes must not cause indefinite postponement of deliveries.
* Each order is placed in a queue of orders such that each order will be ready before the time the truck reaches the delivery destination. Order preparation must be as close as possible to delivery time so as to keep the sandwiches as fresh as possible.
* The orders are prepared and packaged for delivery, and preparation takes place during driving.
* Food can be prepared while the truck is driving to a destination.
* Driver is required to follow the scheduled route at all times.
* When a destination is reached, an employee takes the order to the customer’s door and collects payment.
* If the truck has no orders, it will go back to the supply center.
* If the truck runs low of a product, it will schedule a stop at a supply center to restock.
* There are no minimum purchase amounts on an order.
* A 10-block radius from a main distribution area encompasses the total area of the allowed delivery locations.
* Roadside sales are not a huge part of this program at this time.
* When running out of an ingredient, schedule a stop for distribution center where most convenient. If the ingredient is included in a placed order, make the stop high priority.
* If a delivery location is closer in the queue, then that order should be delivered first.
* City is structured in 20x20 blocks. A block is labeled as a street number and letter. There are 9 houses on each side of a block.
* Traffic may be considered for further development.
* Roadside sales are not a concern of the current goals.
* Orders placed simultaneously should be handled in order of ascending distance. (Closer one)

The client wants a software system that will run the business of the truck. To test the concept of a mobile sandwich shop, the client wants a simulation of the operation of the truck. The software must:

* Allow for order entry.
* Schedule delivery times and the truck route. There must be an easy way to change the heuristics used to create the routes so that the company can experiment with different strategies.
* A lot of the customer customization for the orders is a per customer basis, no restrictions or limitations on what a customer can add extra to their order.
* Scheduling of order preparation and packaging.
* Keep track of the cash register.
* Primarily card purchases, largest bill in register is 20.
* Cash register contains $200 by default.
* Customers must be able to keep track of the location of the truck.
* Indefinite postponement should be handled based on timing.
* Orders should be allowed to be viewed after placement, in addition cancellation is allowed. Orders are allowed to be edited after placement.
* Orders will be assigned unique numbers for identification and organization purposes.
* Future implementations could include different menus, menu items should be able to be hot swapped with other items.
* For the simulation of the sandwich shop, swap the GPS location for a street address to track the delivery progress.

Delivery Implementation (Sprint 1):

* Generate random addresses in the form of 910 South 9th
* Map is implemented with a map of city blocks, there are a total of 20 streets going through in each direction comprising the city blocks, each with 9 houses on each side of the block.
* House numbers are done in increments of 9
* Distribution center is located at (910 South 9th)
* Apartment numbers with no tens place do not exist, as they are the number for the street.
* Block is a quarter mile.
* City is structured in 20x20 blocks. A block is labeled as a street number and letter. There are 9 houses on each side of a block.
* Don’t model numbers directly, use a 2d array of objects called Location, then the location class will have attributes such as type of location and address, address being compromised of house number and street number.
* Print statement should use format similar to “910 South 9th”

Sprint 2

* Add random time that the orders were made.
* Generate 100 random order times.
  + Earliest order time is 10:00am and latest is 7:00pm.
* Priority queue ordered by time.
* Implement a route for the truck to follow.
  + Output the length of the truck’s route.
* Display a simulation of the truck’s movements around the neighborhood.

Sprint 3

* Allow the neighborhood to be resizable(Now make it 10X10).
  + Distribution center stays in the middle (510 East 5th Street)
* Use strategy design pattern that has at least 2 routing strategies.
  + Truck only makes left turns.
  + Truck only makes right turns.
* Add food to the orders.
  + Customer can order Sandwich 1, 2, or 3, Chips 1 or 2, and drink 1, 2, 3
* Compare cost effectiveness of both routes.
  + move from one address to another in 1 unit of time.
  + a stop at a delivery address takes 5 units of time.
  + a right-hand turn takes 2 units of time.
  + a left-hand turn takes 4 units of time.
  + time to prepare a food order is 5 units of time.
  + compute the total length of each route in distance and time.

Sprint 4

* Change time units to hours, minutes, seconds.
  + Assume truck travels 30 miles/hour
  + Locations are 0.03 miles apart.
* Apply Observer Design Pattern
  + GUI one Observer
  + Printer – another observer
  + Truck location, time and order information – Subjects

Sprint 5

* Sandwich truck must return to distribution center at the end
* Represent customer’s orders using decorator pattern.
  + Print order when the truck get to the customer’s location

The client knows that the requirements for this operation are not complete and is relying on the software development company it hires to help flesh out additional details (or even ideas) regarding the mobile sandwich truck.