

MICHIGAN STATE
UNIVERSITY

Project Plan

O.P.E.N. v2.0: Smart Order Picking

The Capstone Experience

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From Students...
...to Professionals

Functional Specifications

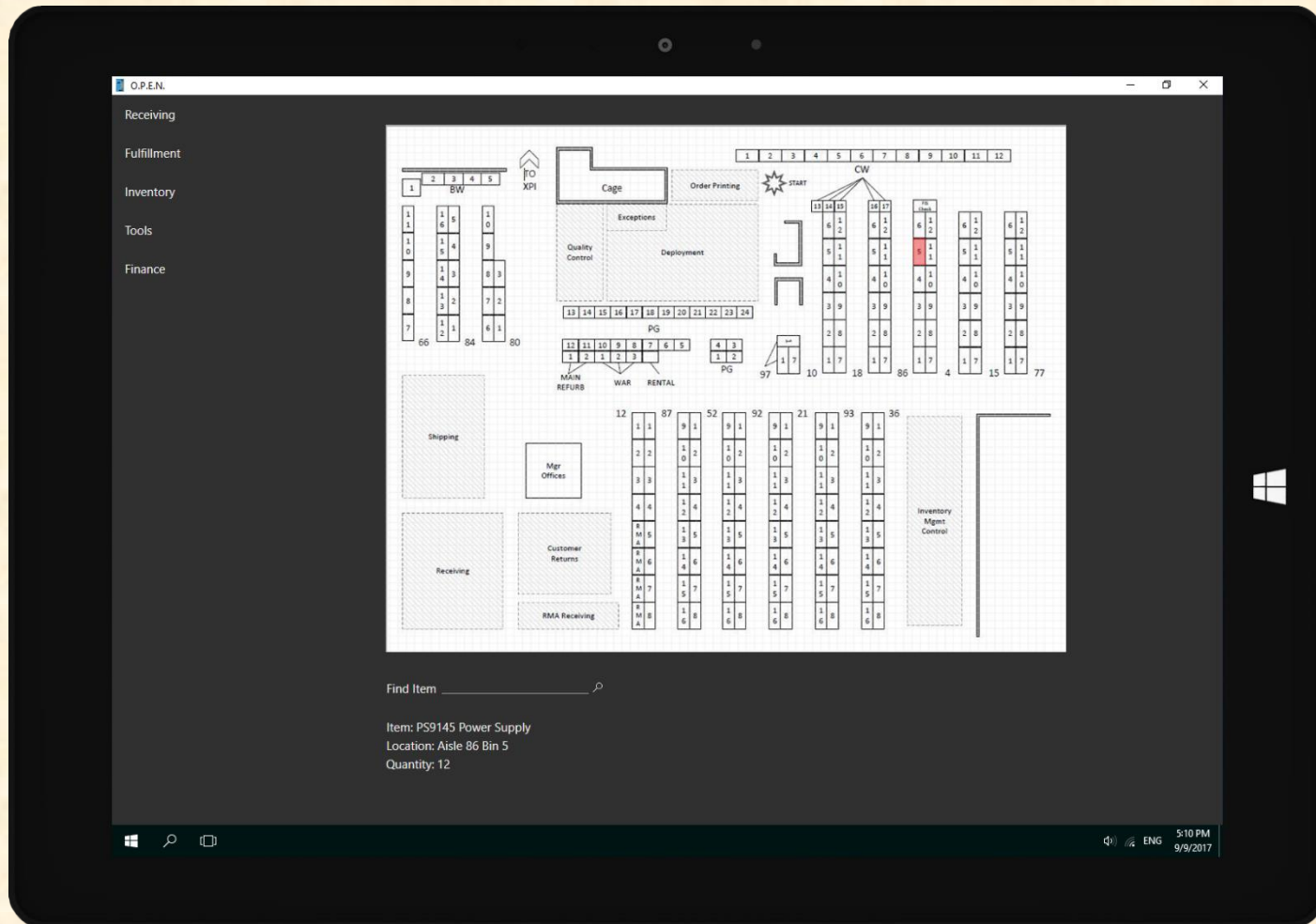
- The Phoenix Group is a POS device distributor
- Warehouse “pickers” collect items to fulfill tickets
- Pickers have a tablet and a barcode scanner
- Goal 1: Find and display the most efficient path to all pick ticket items
- Goal 2: Track inventory in real time as items are scanned and tickets are fulfilled

Design Specifications

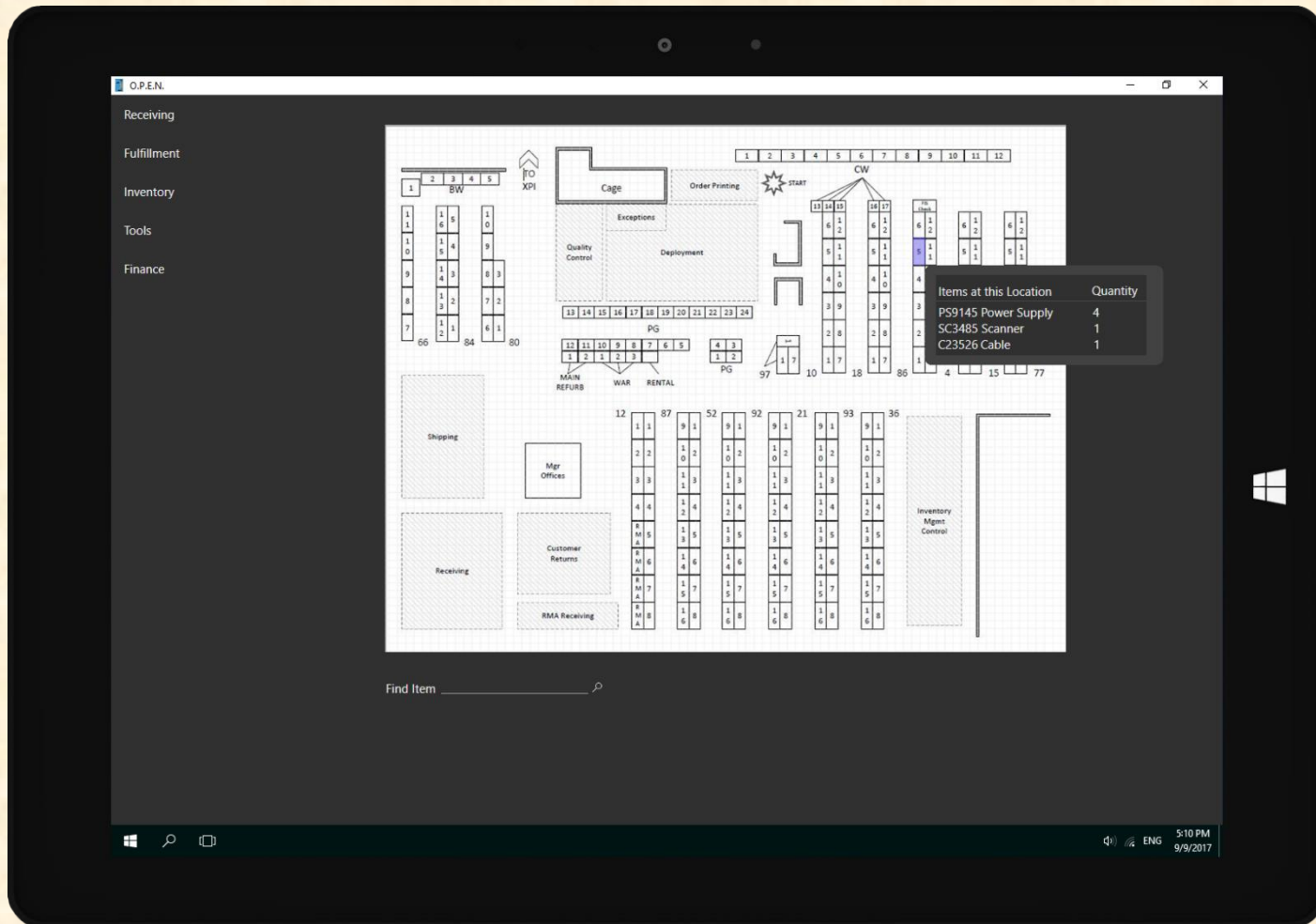
- Client App consists of two displays
- Order Fulfillment Display
 - Map with shortest route
 - Item queue display
 - Zoom/Move map feature
- Inventory Display
 - Click shelves on map for inventory details
 - Search for Items by name or number



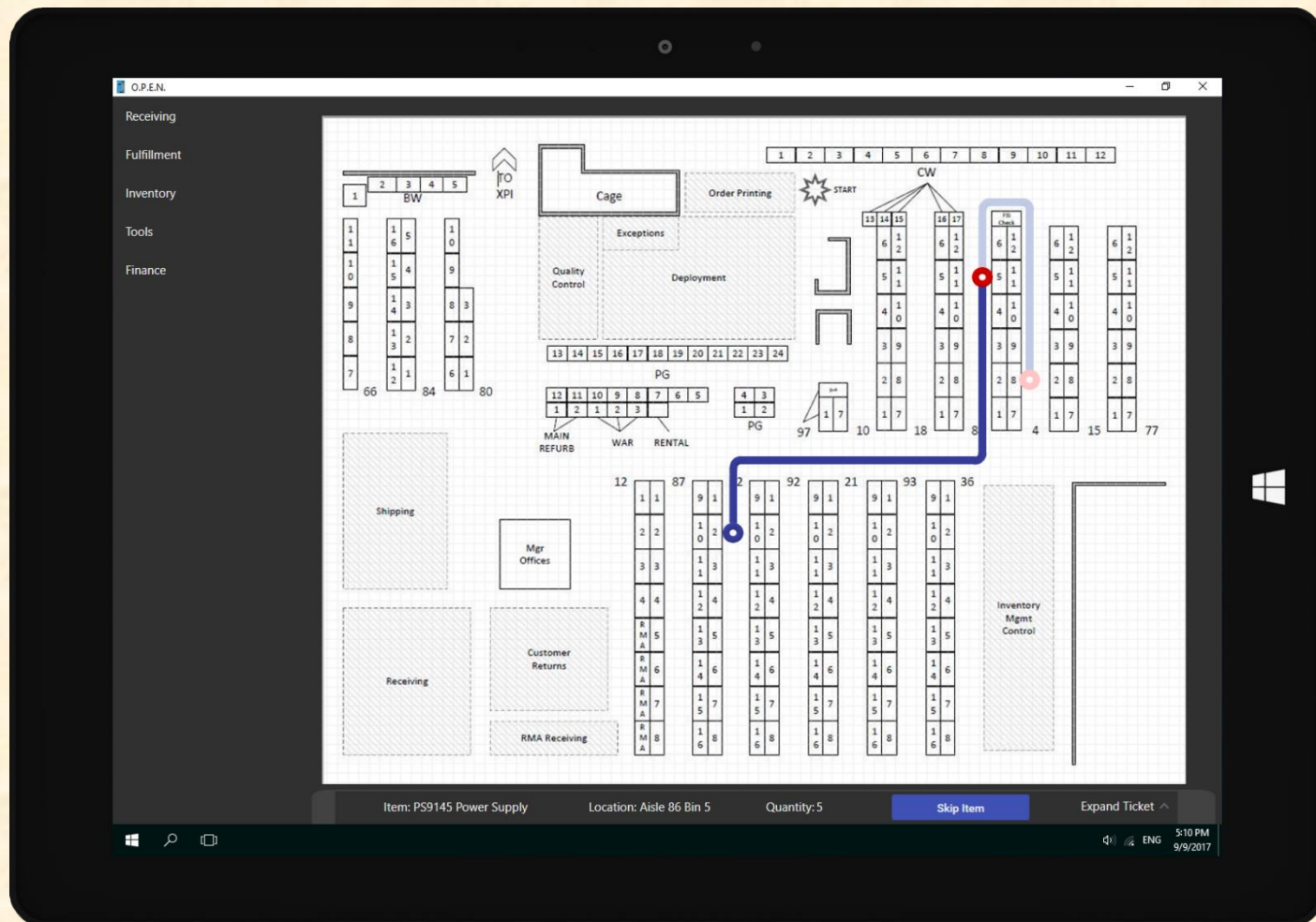
Screen Mockup: Inventory Display



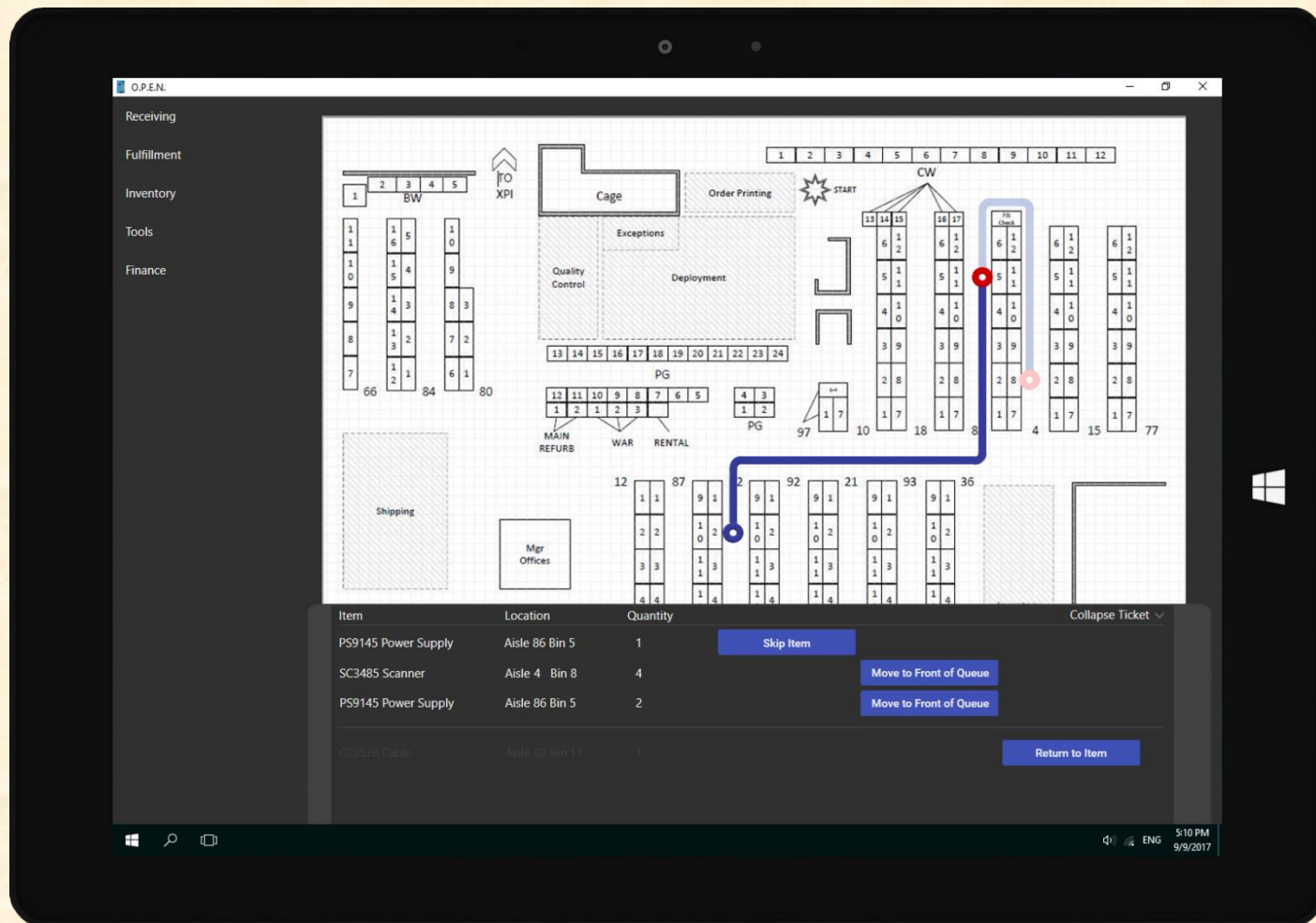
Screen Mockup: Inventory Display



Screen Mockup: Order Fulfillment Display



Screen Mockup: Order Fulfillment Display



Technical Specifications

- **MySQL**

- Holds all inventory data
- Bluetooth Low Energy (BLE) Positions
- Grid Layout
- Exists on the Windows R2 Instance

- **Windows Tablet**

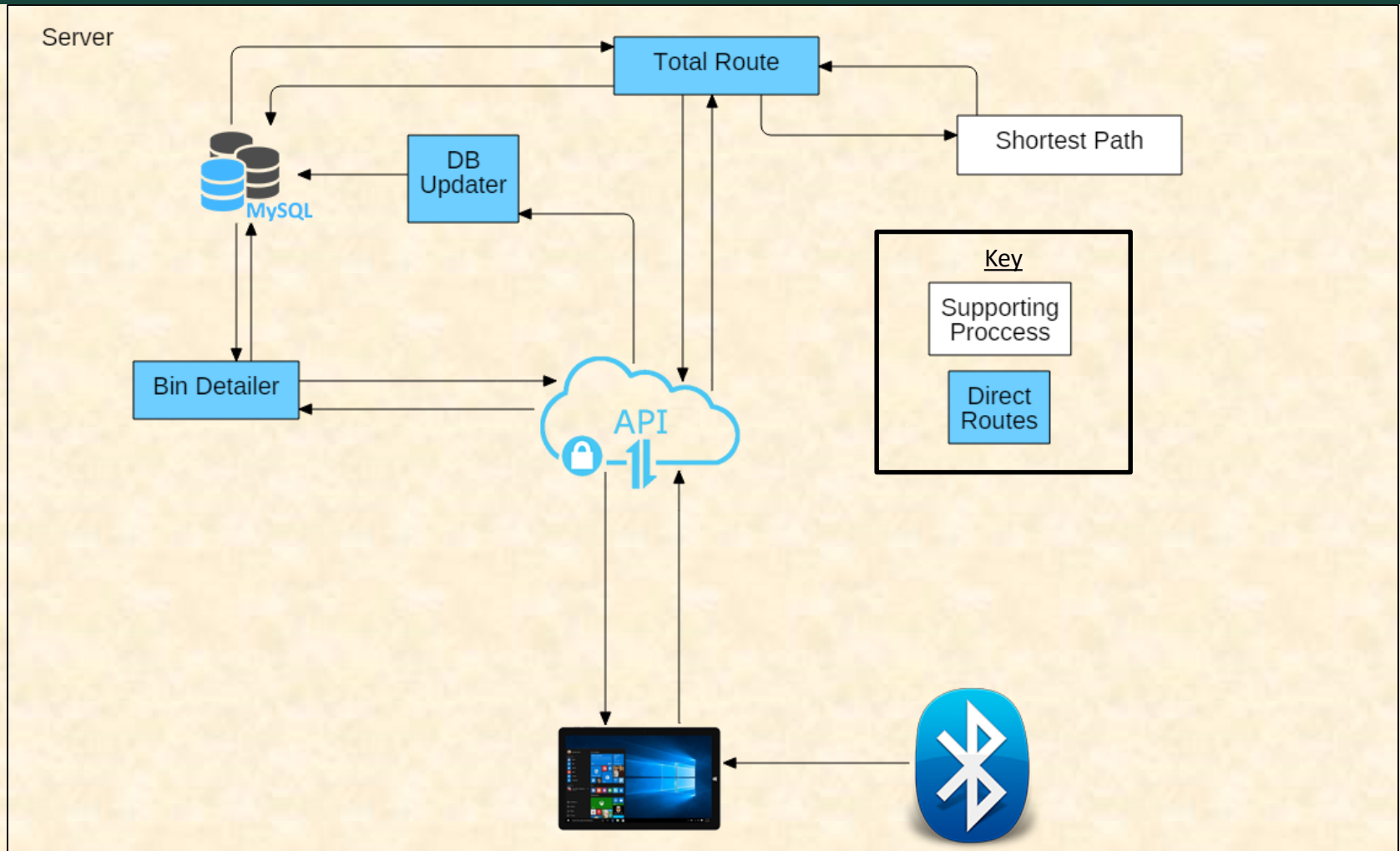
- Self locates with BLE device Received Signal Strength Indication (RSSI)
- Displays route and shelf inventory details

- **Windows R2 Server**

- Service layer between the Database and the Tablet
- Performs intensive routing calculations (shortest route)



System Architecture



System Components

- Hardware Platforms
 - R2 AWS Server
 - Windows Surface Pro Tablet
 - BLE Beacons
 - Barcode Scanner
- Software Platforms / Technologies
 - NodeJS / Express (API Communication backend)
 - MySQL
 - Windows Tablet Application (O.P.E.N. v2)



Testing

- Create a “warehouse map” of capstone lab to test the Bluetooth devices’ accuracy and range
- Test various routes to ensure our quickest-route algorithm efficiently picks the best path
- Test server under load with multiple clients
- Run use cases for usability of the front-end client application



Risks

- Shortest Path Algorithm
 - Finding the absolute shortest path could become too intensive.
 - Instead of finding the absolute best solution, find a good solution
- Beacon Hardware
 - Scalability and accuracy of readings of short range Bluetooth devices
 - Increase device density or use GPS.
- Tablet Power Consumption
 - Frequent network calls and receiving BLE signals
 - Condense data readings and backend calls to decrease network traffic



Questions?

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