I1.03 – Beverage Monitoring & Tracking Improvements

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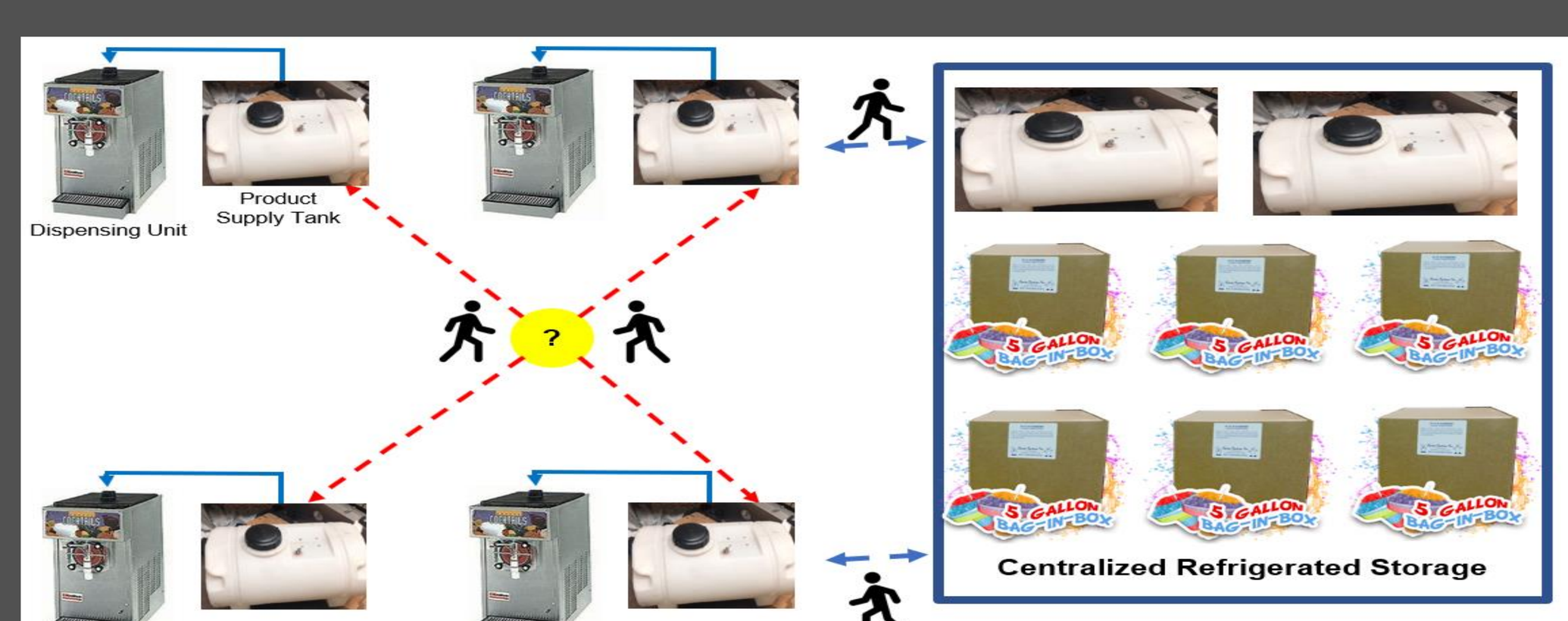
Sponsor Information


- 31 Degrees supports events such as the Louisiana State Fair, the Fort Worth Livestock Show & Rodeo, AT&T Stadium (Dallas Cowboys), Schlitterbahn, Typhoon Texas, FC Dallas, and various music and margarita festivals.
- They have 300+ dispensing machines in their fleet.

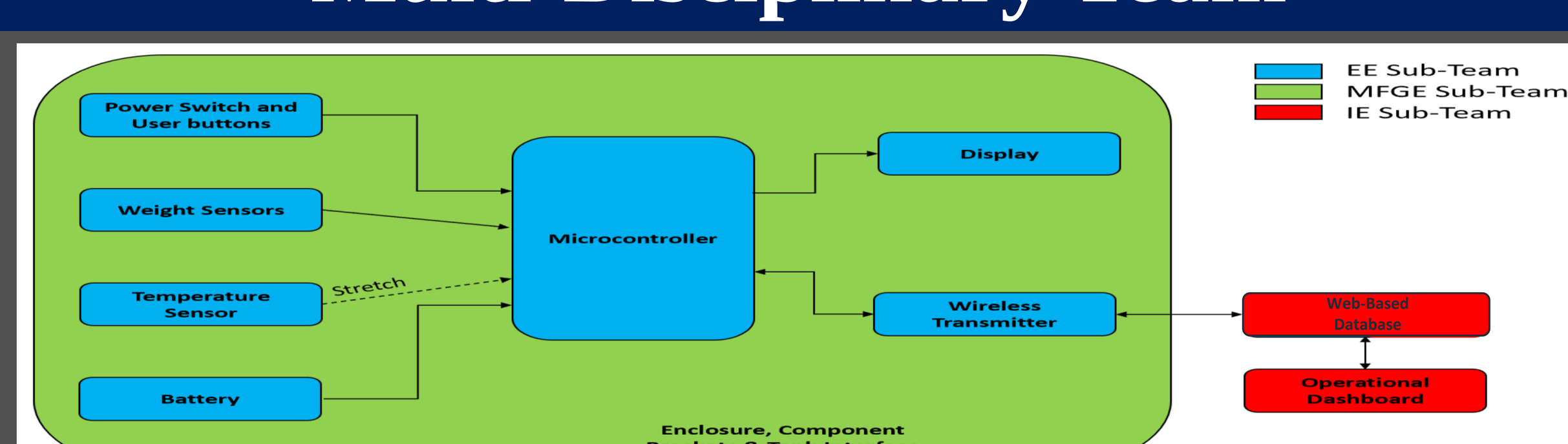
Problems with Current Process

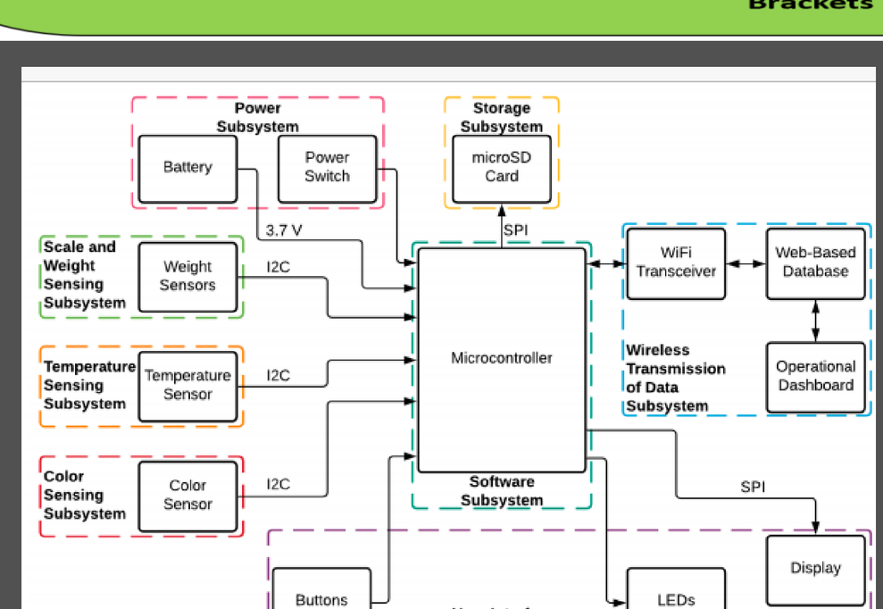


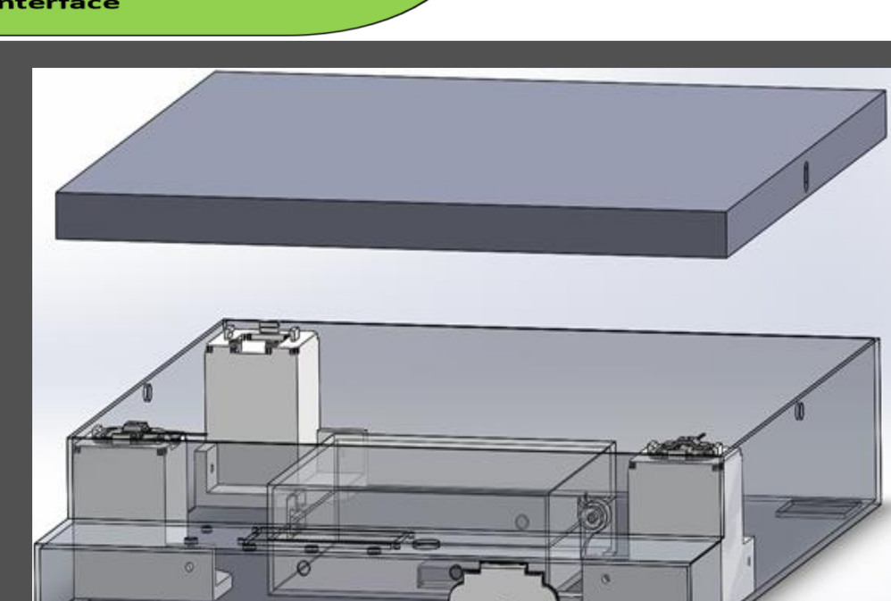
Several problems must be addressed:

1. Operators do not know how much product is in the supply tank at each dispensing machine, leading to machines running dry before they are reloaded.
2. Operators do not know which tanks need to be refilled, or the priority of re-filling each tank.
3. Companies have little visibility as to whether cash register receipts correspond to the amount of product dispensed.

Multi-Disciplinary Team





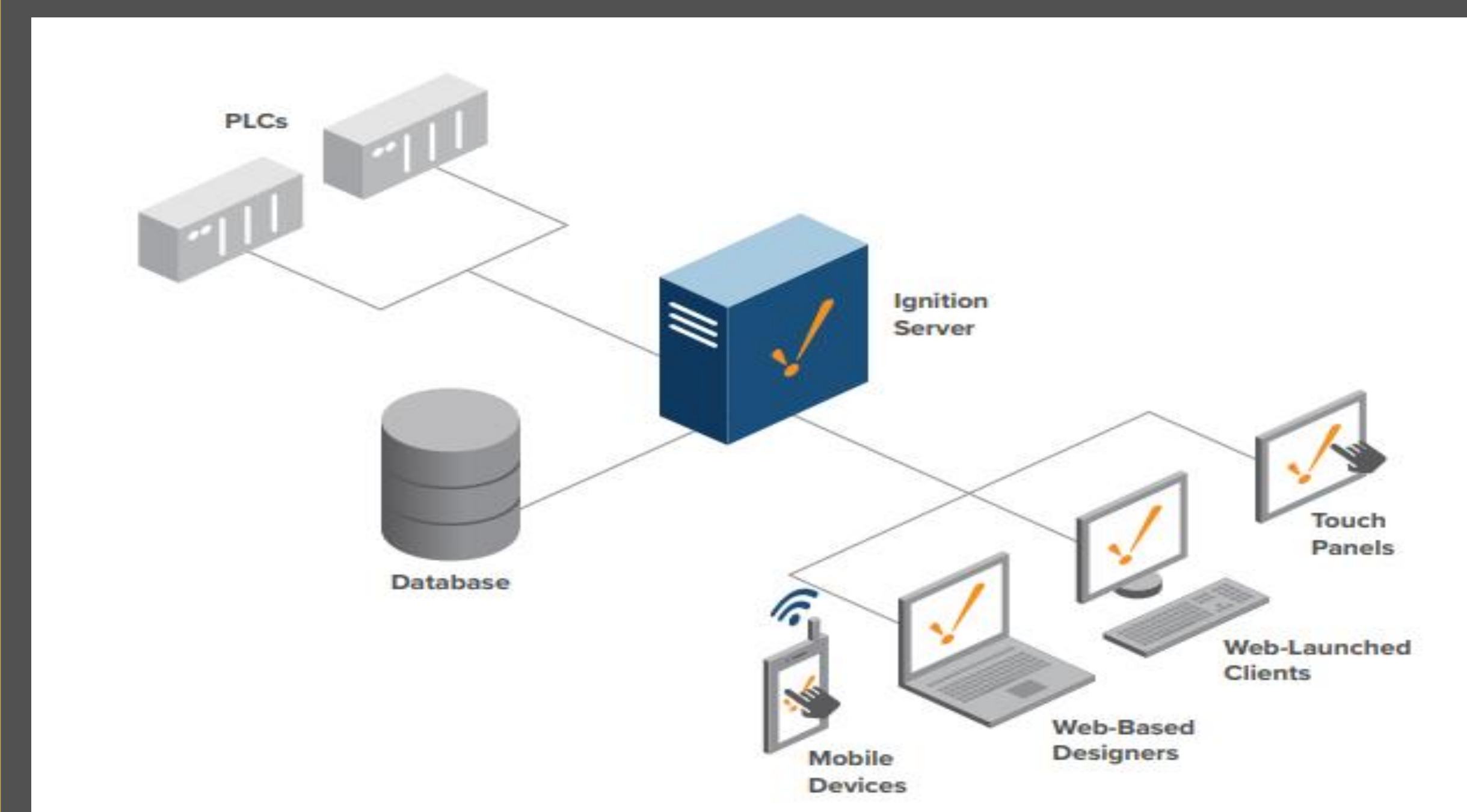


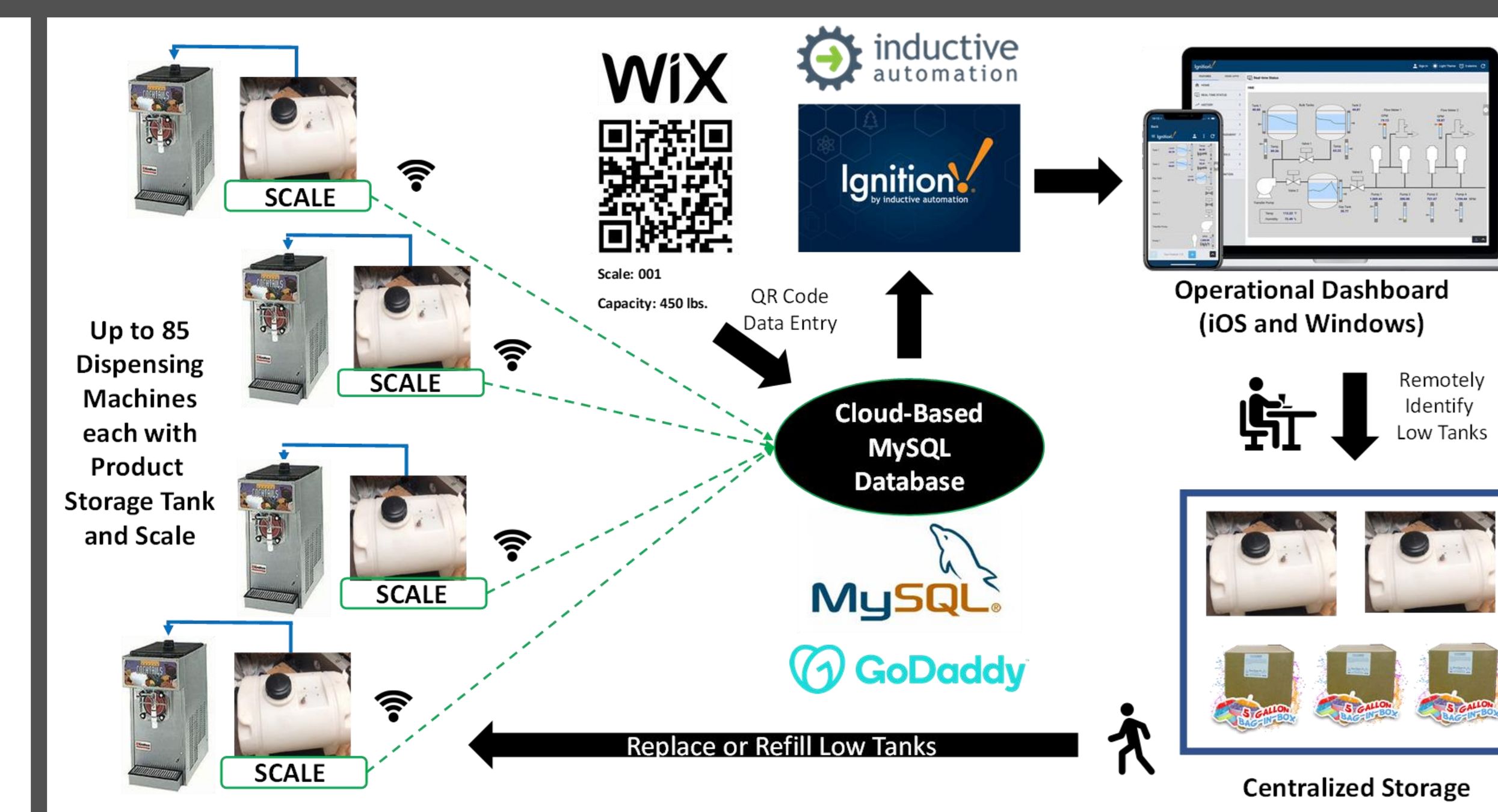
- The IE sub-team is responsible for the database and operational dashboard.
- The EE and MFGE sub-teams are responsible for the smart scale system.

Project Objectives

1. Design/implement a database to receive data from the smart scale.
2. Design and implement a user-friendly operational dashboard to efficiently prioritize and schedule tank refills.
3. Design and implement a reporting system to identify how much product was dispensed, by machine, for a given event.

System Architecture





Database & Operational Dashboard Features

Parameter	*Min*	*Max*	*Comments*
Scale ID	n/a	n/a	Uniquely identifies scale device
Date	n/a	n/a	Month, Day, and Year at which data is taken
Time	n/a	n/a	Time of day at which data is taken
Weight of Product in Tank	4 lbs	400 lbs	Weight of available product taken by sensor
Volume of Product in Tank	0 gal	44 gal	Calculated volume of available product based on sensed weight
Volume of Product Dispensed from Tank	0 gal	44 gal	Calculated volume of dispensed product based on sensed weight
Temperature of Product in Tank	20 °F	80 °F	Temperature of product taken by sensor
Voltage Level of Battery	0	TBD	Determine available battery capacity
Tank Warning Level	n/a	n/a	Signal to user when tank level is low
Tank Alert Level	n/a	n/a	Signal to user when tank level is empty

Parameter	Min	Max	Comments:
Number of Operating Systems	2	2	Goal is to include both Windows and iOS operating systems.
Number of concurrent users.	1 user	5 users	This is based on the pricing of software from Inductive Automation.
Update Frequency	60 min	5 min	A user defined update system
Ease	n/a	n/a	Should feel very intuitive to view and change as necessary
Continuous Monitoring	n/a	n/a	The system will provide continuous monitoring of the weight of product.
Warning Level	20%	20%	Dashboard displays the amount of product in yellow; no alarm necessary.
Alarm Level	5%	5%	Dashboard displays amount of product in red; sends visual and audio signal to dashboard and sorts tank to the top of the list for ease of viewing.

Parameter	Min	Max	Comments:
All-In-One View	n/a	n/a	Shows general overview of all available tanks; default sorting by least amount of product to most amount of product
Geographical View	n/a	n/a	Syncs locations of each of the tanks to their relative positions at the site
Drill-Down Capability	n/a	n/a	Can click on a specific tank to display the amount of product, battery life of scale, approximate location, and temperature of product
Segmented Period Report	n/a	n/a	Able to have a breakdown a specific tank, or group of tanks, broken down to a small, discrete time period. Information can be displayed in charts and graphs
Overall Report per Tank	n/a	n/a	Takes an overall report of all variables, as they change throughout time, for each container. Could pull a report for a group of tanks as well. Information can be displayed in charts and graphs
Overall Report	n/a	n/a	Takes an overall report of all variables, as they change throughout time, for all containers. Information can be displayed in charts and graphs

- The following features will be designed into the database and operational dashboard.

Database Tables in MySQL

Machine ID	Capacity (gallons)	Cooling System	Location
100	TBD	TBD	TBD
101	TBD	TBD	TBD
102	TBD	TBD	TBD
103	TBD	TBD	TBD
104	TBD	TBD	TBD
105	TBD	TBD	TBD
106	TBD	TBD	TBD
107	TBD	TBD	TBD
108	TBD	TBD	TBD
109	TBD	TBD	
110	TBD	TBD	
111	TBD	TBD	
112	TBD	TBD	
113	TBD	TBD	
114	TBD	TBD	
115	TBD	TBD	
116	TBD	TBD	
117	TBD	TBD	
118	TBD	TBD	
119	TBD	TBD	
120	TBD	TBD	
121	TBD	TBD	
122	TBD	TBD	
123	TBD	TBD	

Machine Table

Location ID	Location Type (P = Partnership, S = Special Event, W = Warehouse, R = Repair, D = Developent)
AT&T Stadium	P
FC Dallas	P
Fort Worth Rodeo	S
Houston Margarita Festival	S
Main Street Art Festival	S
Schlitterbaun-Galveston	P
Schlitterbaun-New Braunfels	P
Typhoon Texas-Pflugerville	P
Typhoon Texas-Katy	P
Warehouse	W
Repair - San Antonio	R
Texas State	D

Location Table

Tank ID	Tank Capacity (gallons)	Tank Warning Level (weight - lbs.)	Tank Alert Level (weight - lbs.)	Type	Location
10	10	25	16.7	Vertical	AT&T Stadium
11	10	25	16.7	Vertical	AT&T Stadium
12	10	25	16.7	Vertical	AT&T Stadium
13	10	25	16.7	Vertical	AT&T Stadium
14	10	25			
15	10	25			
16	10	25			
17	10	25			
18	10	25			
		25			
		25			
		25			
		25			
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		25			
		25			
		25			
		25			

Tank Table

Scale ID	Scale Capacity (lbs.)	Tank Type	Location
1	440	Prototype-Vertical	Texas State
2	440	Prototype-Horizontal	Texas State
3	440	Prototype	TBD
4	440	Prototype	TBD
5	440	Prototype	TBD
6	440	Prototype	TBD
7	440	Prototype	TBD
8	440	Prototype	TBD
9	440	Prototype	TBD
100	440	Vertical	TBD
101	440	Vertical	TBD
102	440	Vertical	TBD
103	440	Vertical	TBD
104	440	Vertical	TBD
105	440	Vertical	TBD
106	440	Vertical	TBD
107	440	Vertical	TBD
108	440	Vertical	TBD
109	440	Vertical	TBD
110	440	Vertical	TBD
111	440	Vertical	TBD
112	440	Vertical	TBD
113	440	Vertical	TBD
114	440	Vertical	TBD

Scale Table

Date	Time	Machine ID	Tank ID	Scale ID	Location	Weight of Product (lbs.)	Temperature of Product (°F)	Voltage Level of Battery (volts)	Tank Warning Level (weight)	Tank Alert Level (weight)
TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			
				TBD	TBD	TBD	TBD			

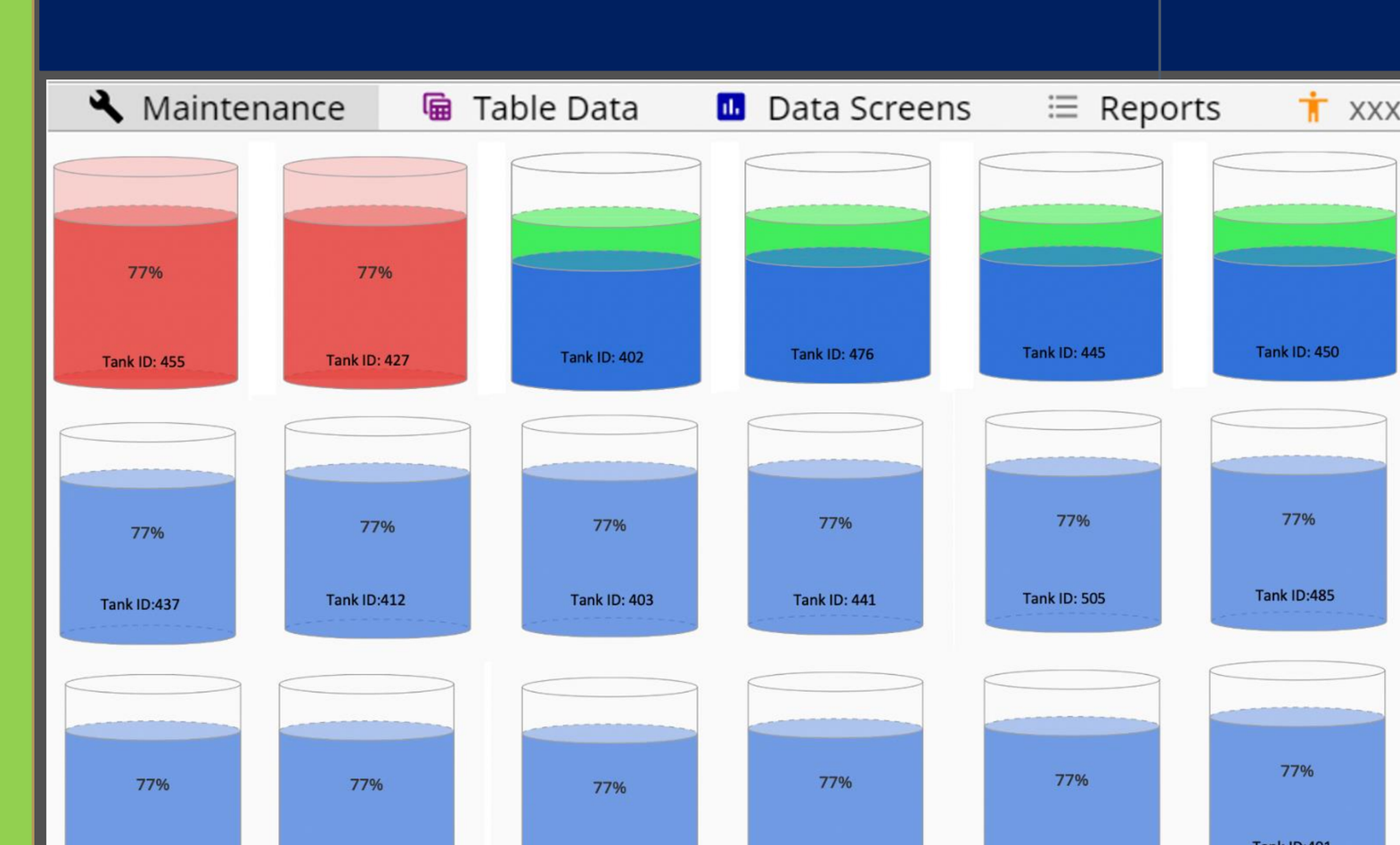
Consolidated Table

Machine ID	Tank ID	Scale ID	Location ID
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD

ID Table

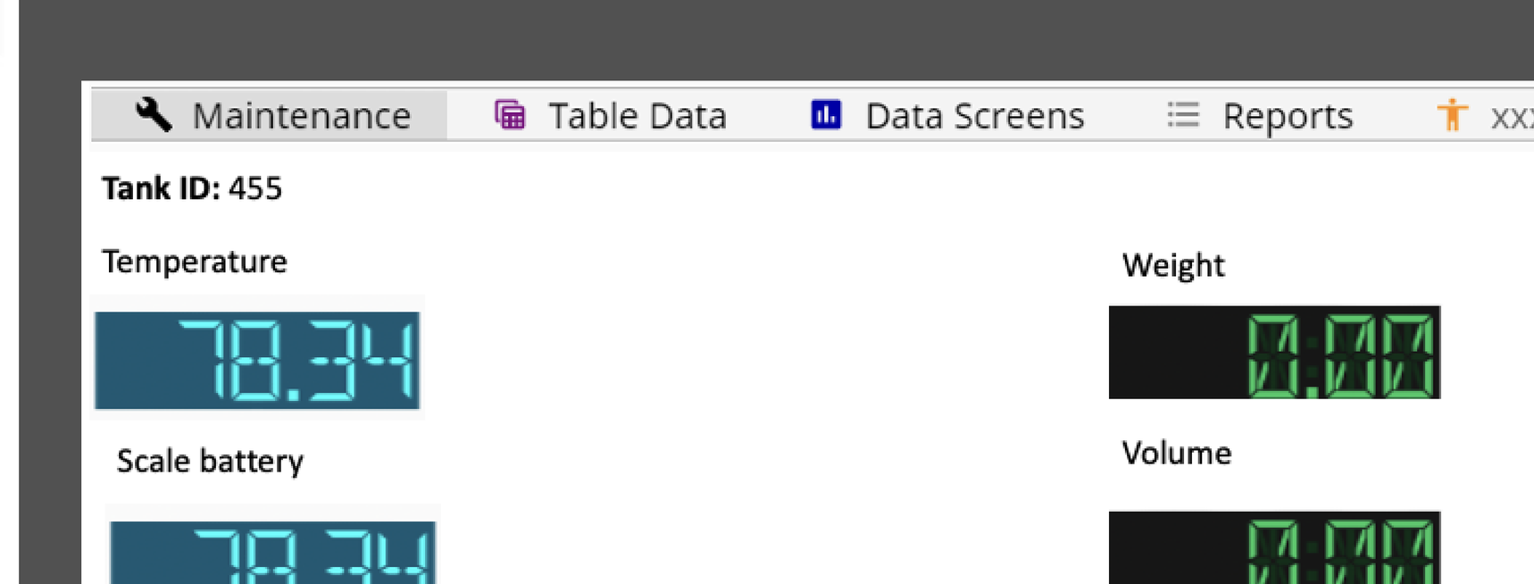
- The following features will be designed into the database and operational dashboard.

Operational Dashboard Models



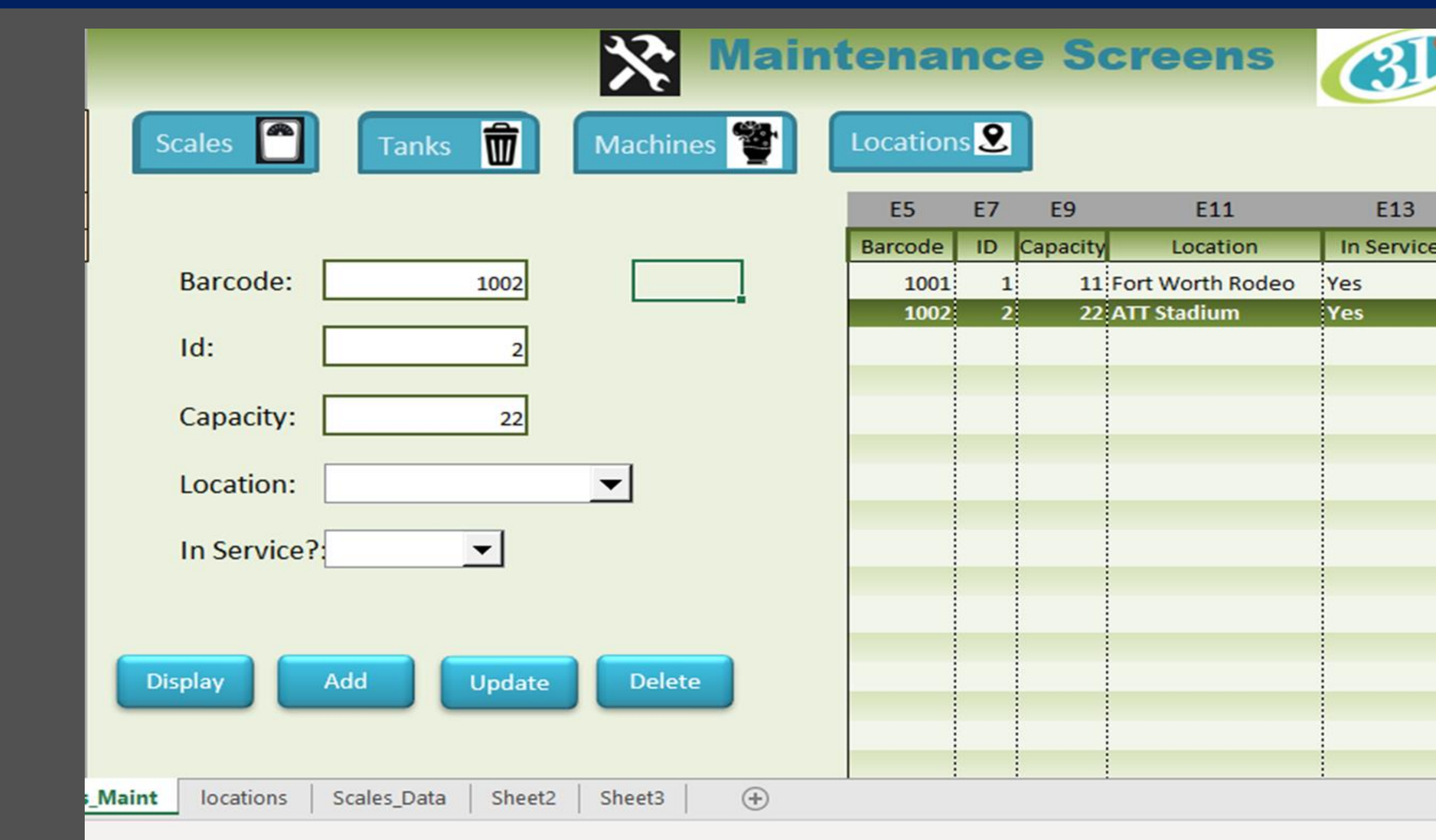
Tanks by volume

Drill down view with map for partnerships



Drill down view for sponsored events

Maintenance Screens



- For each event, machine IDs, product tank IDs, scale IDs, product flavor, and event location IDs must be synchronized through the update of maintenance screens.
- Maintenance screens are accessed through Excel which update tables in MySQL.

Data Input Through QR Codes

- Data will be input into the system via QR codes on each machine, product tank, and scale.
- QR codes will have 1"x1" dimensions.
- QR codes will be used to update maintenance screens.

- Machine IDs
  - ID 1000 - 1999: 120V, air-cooled machines
  - ID 1000 - 1999: 220V, water-cooled machines
- Tank IDs
  - ID 10 – 99: 10-gallon vertical tanks
  - ID 100 – 199: 32-gallon vertical tanks
  - ID 200 – 299: 44-gallon vertical tanks
  - ID 400 – 499: 25-gallon horizontal tanks
  - ID 500 – 599: 50-gallon horizontal tanks
- Scale IDs
  - ID 1 – 9: prototype scales
  - ID 100 – 199: scales for vertical tanks
  - ID 200 – 299: scales for horizontal tanks

Future Work (2nd Semester)

- Purchase and test QR codes for the tanks & machines
- Put conceptual design of dashboard into a physical and multi-screen capable dashboard.
- Preliminary test/design 31 Degree user dashboard.
- Develop data reports.

Team Members

From left to right:
Nathan Docherty
Jackson Guerry
Walid Riachi
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Seth Minter

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