

**MICHIGAN STATE**  

---

**U N I V E R S I T Y**

# Project Plan

## Optimizing Car Dealership Inventory

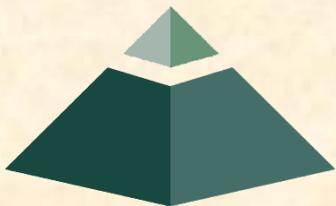
### The Capstone Experience

Team Urban Science

Justin Girard  
Tyler Huttenga  
Joey Norwood  
Anthony Santoro  
Hannah White

Department of Computer Science and Engineering  
Michigan State University

Spring 2016



*From Students...  
...to Professionals*

# Functional Specifications

- Web Application (Dealers)
  - Assist dealerships in determining the amount and type of vehicles to purchase for their lot
  - Create QR codes to assist with vehicle tracking
- Mobile Application (Customers and Dealers)
  - Allow users to view the inventory of a dealership
  - Aid a user in finding for a vehicle on the lot
  - Remove a vehicle or update a vehicle's position



# Design Specifications

- Web Application
  - Calculate and edit purchase recommendations
  - View previous purchase recommendations
  - View dealer's inventory
  - Input vehicle VINs to generate QR codes
- Mobile Application
  - Display dealer's inventory and filter vehicles
  - Direct user to a vehicle's location via a map
  - Controls for the dealer to manage vehicles



# Screen Mockup: Calculator

**URBAN SCIENCE** : Dealership Inventory Optimization System Dashboard Settings About Log Out

**Dashboard**

- Calculator
- Recommendations
- Inventory
- QR Code Generator

### Calculator

Number of vehicles:

Budget:

### Recommended Vehicles

Make	Model	Year	Recommended
Ford	Focus	2015	1
Ford	Fiesta	2015	1
Ford	Escape	2015	1
Ford	F-150	2015	4

### Ford F-150: Recommendation Details

Ford F-150 (2015)

Number of F-150s Recommended:  Override:

Trim:	XL	XL T	Limited	Platinum	King Ranch
Override:	<input type="text" value="2"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="2"/>	<input type="text"/>
Recommended:	<input type="text" value="3"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>



# Screen Mockup: Recommendations

URBAN SCIENCE : Dealership Inventory Optimization System

Dashboard Settings About Log Out

Dashboard

- Calculator
- Recommendations
- Inventory
- QR Code Generator

### Inventory Recommendations

Date	Budget	Number of Vehicles																				
1/13/16	\$300000.00	7																				
<table border="1"><thead><tr><th>Make</th><th>Model</th><th>Year</th><th>Recommended</th></tr></thead><tbody><tr><td>Ford</td><td>Focus</td><td>2015</td><td>1</td></tr><tr><td>Ford</td><td>Fiesta</td><td>2015</td><td>1</td></tr><tr><td>Ford</td><td>Escape</td><td>2015</td><td>1</td></tr><tr><td>Ford</td><td>F-150</td><td>2015</td><td>4</td></tr></tbody></table>			Make	Model	Year	Recommended	Ford	Focus	2015	1	Ford	Fiesta	2015	1	Ford	Escape	2015	1	Ford	F-150	2015	4
Make	Model	Year	Recommended																			
Ford	Focus	2015	1																			
Ford	Fiesta	2015	1																			
Ford	Escape	2015	1																			
Ford	F-150	2015	4																			
Trim:      XL              XLT              Limited              Platinum              King Ranch																						
Recommended: <input type="text" value="2"/> <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="2"/> <input type="text" value="0"/>																						
1/12/16	\$75000.00	3																				
1/11/16	\$75000.00	3																				
1/10/16	\$75000.00	3																				
1/9/16	\$75000.00	3																				
1/8/16	\$75000.00	3																				
1/7/16	\$75000.00	3																				



# Screen Mockup: Inventory

URBAN SCIENCE : Dealership Inventory Optimization System

Dashboard Settings About Log Out

Dashboard

Calculator

Recommendations

Inventory

QR Code Generator

Current Incomming

Search

#	Make	Model	Year	Trim	VIN
25	Ford	F-150	2016	S Sedan	P135H812
26	Ford	F-150	2016	S Sedan	J225A522
27	Ford	F-150	2016	S Sedan	Z122B635
28	Ford	F-150	2016	S Sedan	A185J775
29	Ford	F-150	2016	S Sedan	N083K945
30	Ford	F-150	2016	S Sedan	K001H554
31	Ford	F-150	2016	SE Hatch	Q576R396
32	Ford	F-150	2016	SE Hatch	D972G275
33	Ford	F-150	2016	SE Hatch	T777D432
34	Ford	F-150	2016	SE Hatch	P452S211
35	Ford	F-150	2016	SE Hatch	E321H905

Cost	Color	Date Arrived	Time On Lot
\$25000	Black	2/1/2016	10 Days

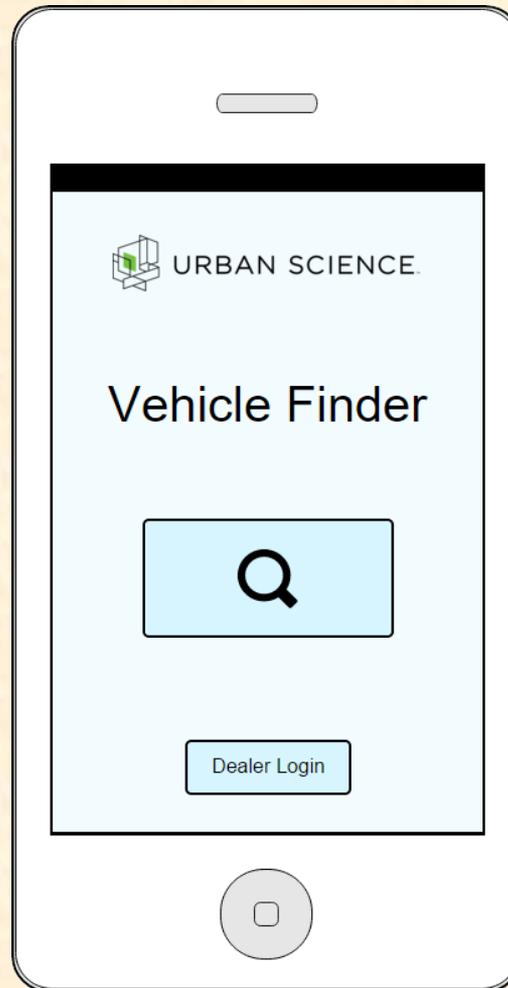


# Screen Mockup: QR Generator

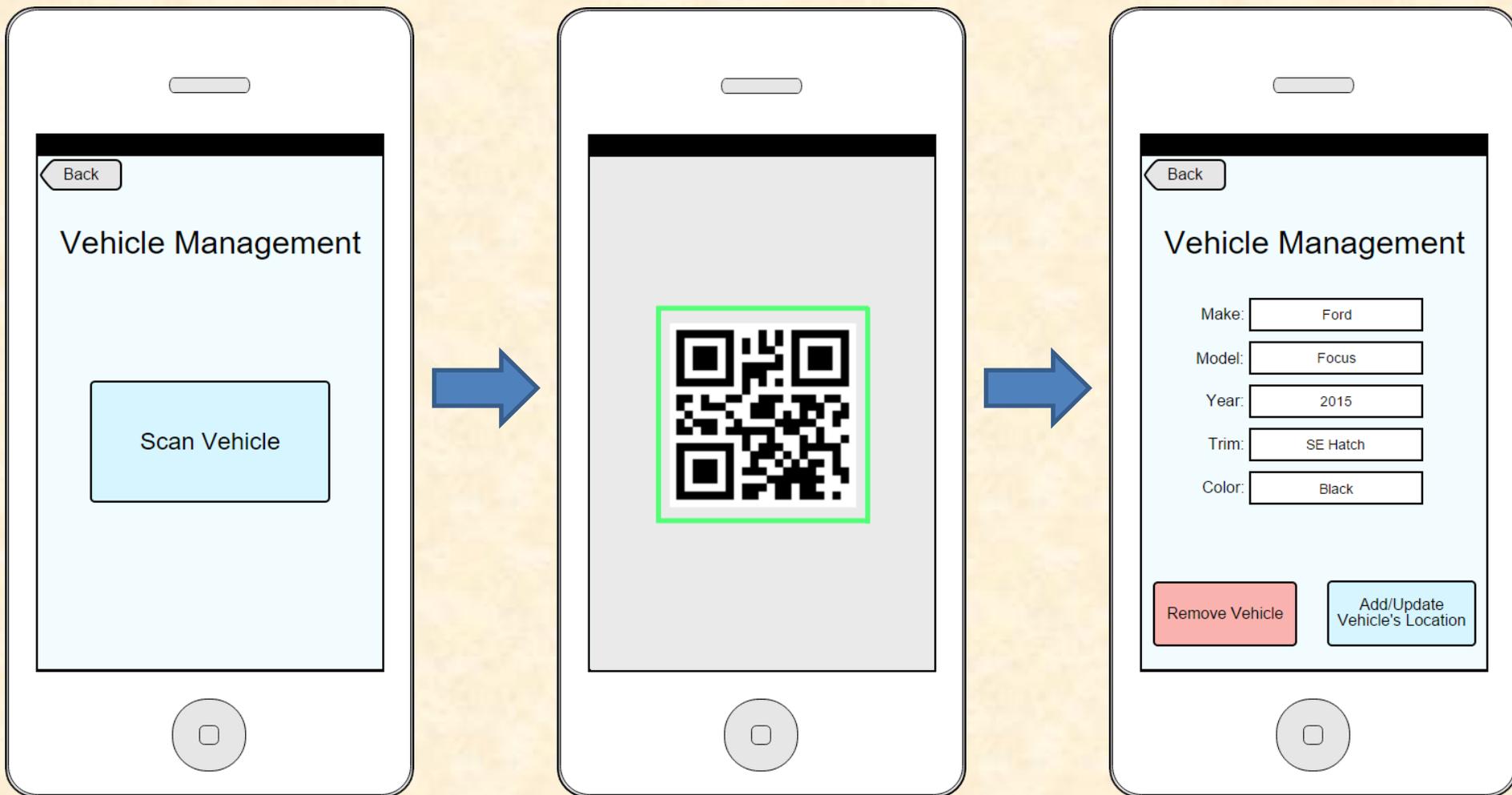
The mockup shows a web application interface for the QR Generator. At the top, the header includes the URBAN SCIENCE logo and the text "URBAN SCIENCE : Dealership Inventory Optimization System". Navigation links for "Dashboard", "Settings", "About", and "Log Out" are located in the top right. A dark sidebar on the left contains a "Dashboard" menu with options for "Calculator", "Recommendations", "Inventory", and a highlighted "QR Code Generator" button. The main content area is titled "VINs:" and contains three input fields for VINs, with the first field containing "1PZ18273H34". Below these fields is a small input field with the number "2" and a green "Add VIN Fields" button. At the bottom of the form area are two buttons: a red "Clear Fields" button and a green "Create" button.



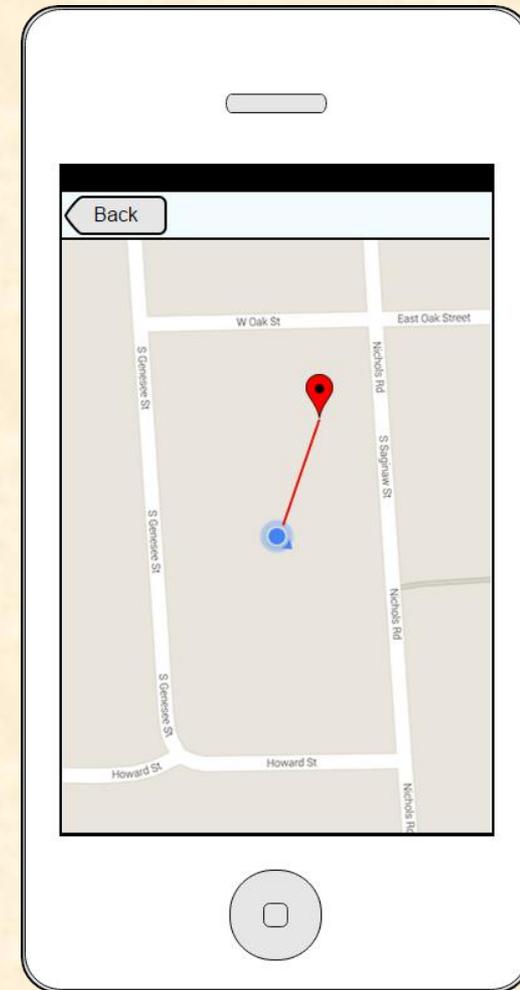
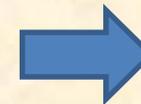
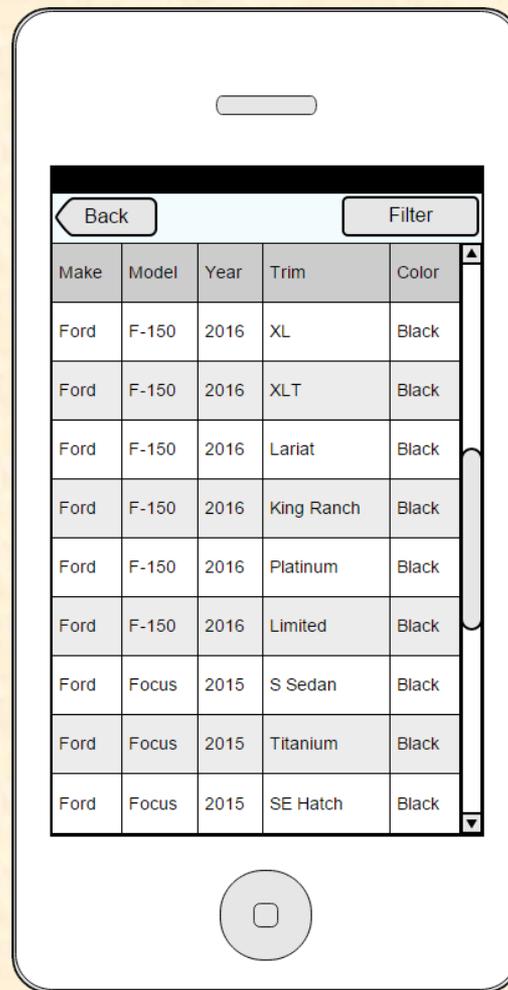
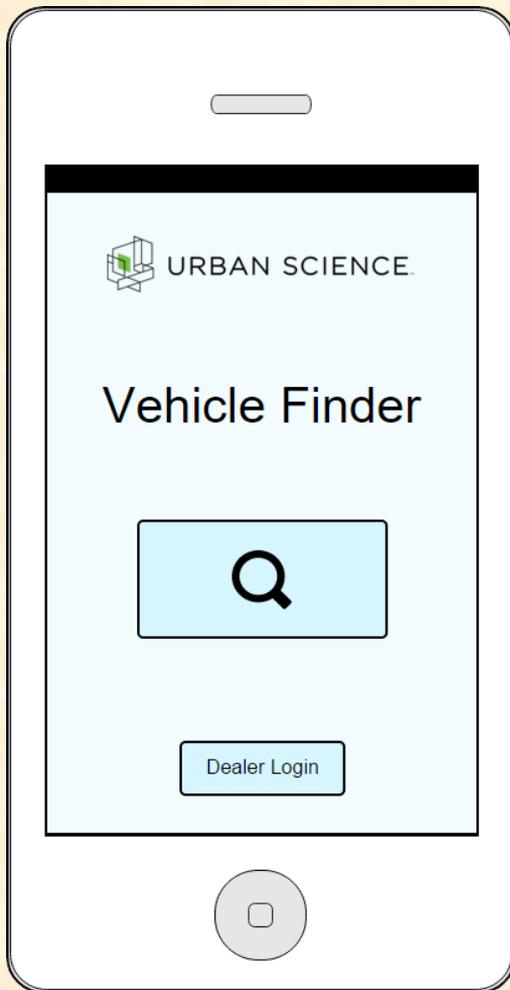
# Screen Mockup: Home Screen



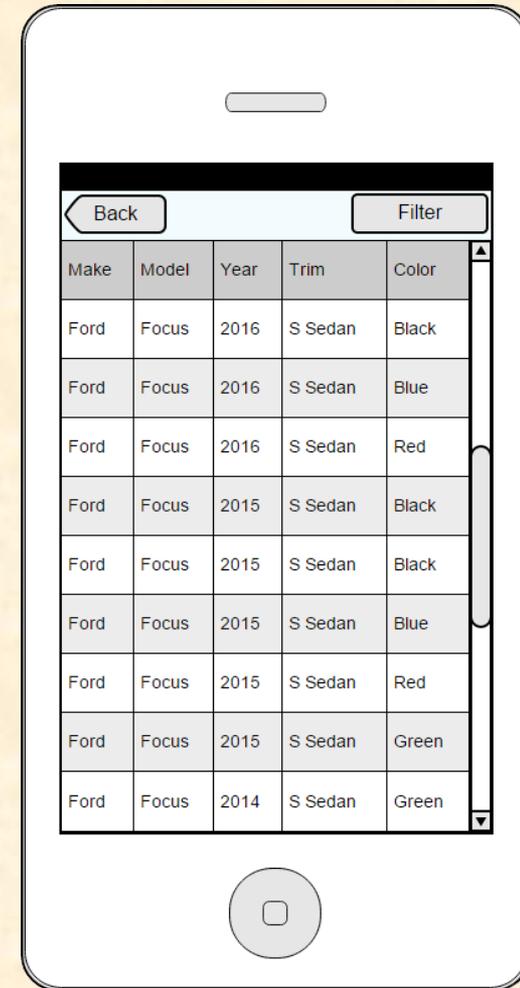
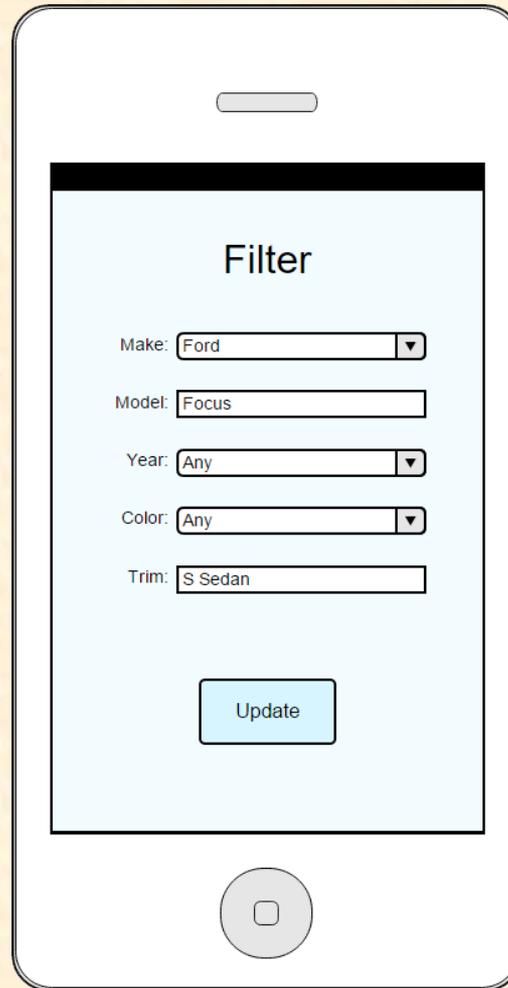
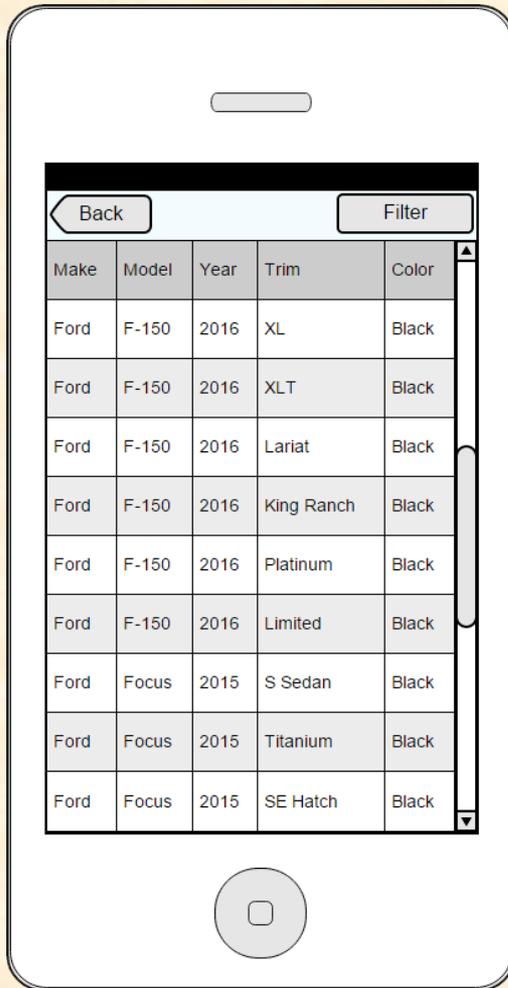
# Screen Mockup: Vehicle Management



# Screen Mockup: Vehicle Finder



# Screen Mockup: Filter

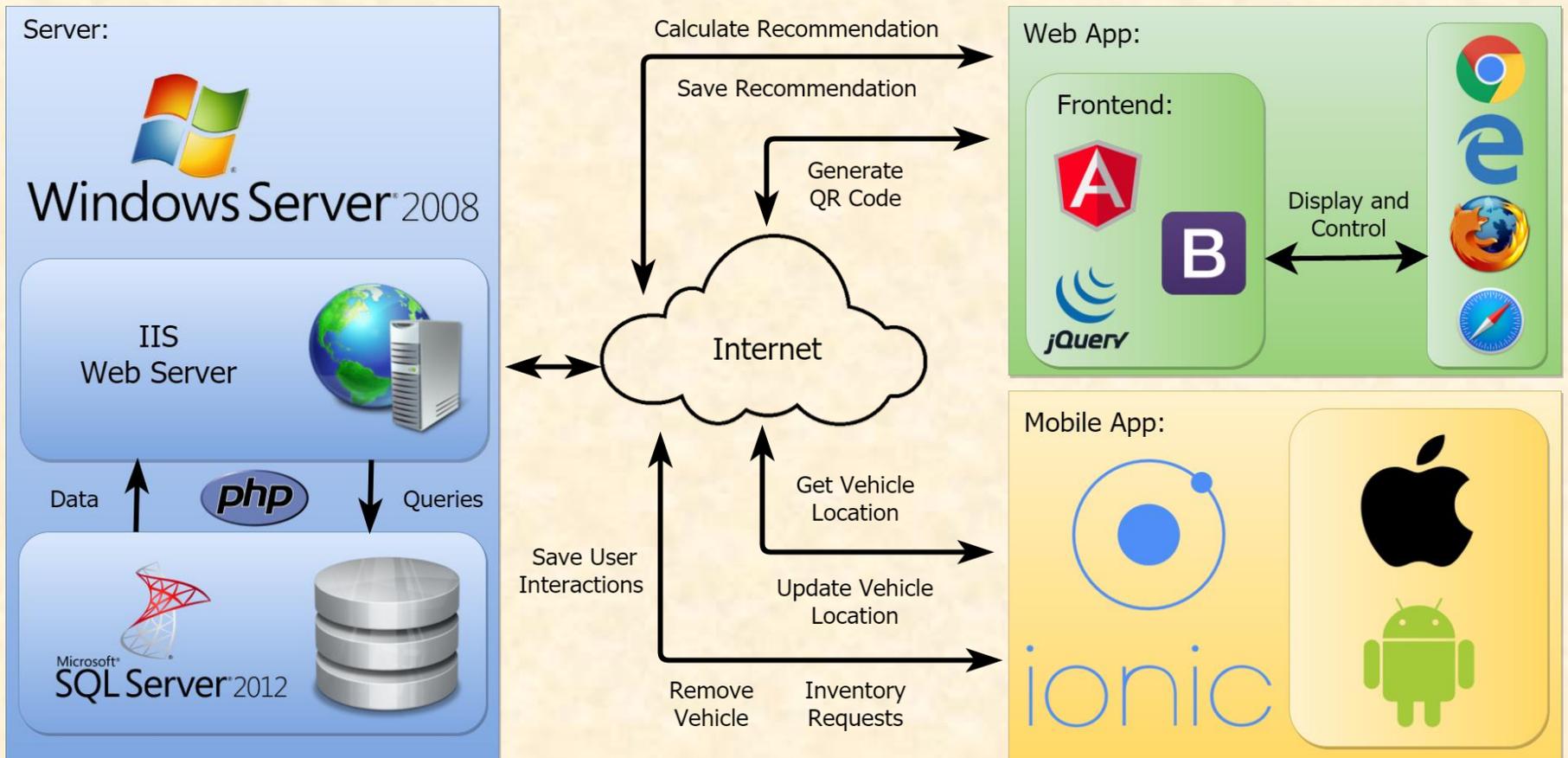


# Technical Specifications

- Server
  - Windows Server 2008 R2 Datacenter
  - IIS Web Server
  - Microsoft SQL Server 2012
- Web Application
  - Bootstrap, AngularJS, jQuery, HTML, CSS, JS
  - PHP and SQL
  - jquery.qrcode.js QR code plugin
- Mobile Application
  - Ionic Framework: HTML, CSS, and JS
  - Barcode Scanner plugin



# System Architecture



# System Components

- Hardware Platforms
  - Windows Server 2008 R2 Datacenter
  - iOS and Android Devices
- Software Platforms / Technologies
  - Microsoft SQL Server 2012 Management Studio
  - Internet Information Services (IIS) 7.5
  - PhpStorm 10.0.3, Xcode 7
  - Version Control: Team Foundation Server (TFS) + Git
  - Desktop Browsers: Chrome, Firefox, Safari, etc.



# Testing

---

- Unit-test both the web and mobile applications to ensure crucial functionality and stability
- Use mock instantiations and assertions as provided by Jasmine and Karma frameworks
- Use Karma to test web application against multiple browsers for compatibility checks
- Manual testing and exploration to check for bugs and performance reliability



# Risks

- Algorithm for recommendations is in the works
  - Simulate until available and design for easy implementation
- Little experience with Ionic framework and libraries (Bootstrap, AngularJS, etc.)
  - Utilize online documentation and tutorials, as well as utilize basic templates/demos for quick prototyping and understanding
- Interface design has to be intuitive and simple
  - Frequent internal testing and reviews from our client
- Uncertainty of how to use SQL Server 2012
  - Utilize online documentation and tutorials for self-learning (along with asking our client for data-specific questions)

