Project Plan
Shrink Reduction Using Blockchain Technology

The Capstone Experience

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Functional Specifications

• Develop a blockchain system to reduce shrink
• Track highly-perishable items to prevent waste
• Create an iOS and web application to access the data
• Notification system to alert users when products are close to expiration
• Dashboard to display product analytics
Design Specifications

• Single member network blockchain to store product information
• Access data through SQL Database
• iOS and Web App as user interfaces
• PowerBI for Web App dashboard analytics
QR Scanner
Search for Product

Order Number: ________
Name: Apples
UPC: ________________

More Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Expire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>05/20/2018</td>
</tr>
<tr>
<td>Apples</td>
<td>05/21/2018</td>
</tr>
<tr>
<td>Apples</td>
<td>05/21/2018</td>
</tr>
</tbody>
</table>
Product Info

- **NAME:** Apple
- **EXPRIE:** 05/21/2018
- **UPC:** 648294638440
- **ZONE:** AUTO
- **AISLE:** 04
- **SECTION:** 05
- **POSITION:** 12
- **FIXTURE:** A
- **ILC:** AUTO040512A
# Alerts

Expiring in 48 Hours

<table>
<thead>
<tr>
<th>Name</th>
<th>Expire</th>
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</thead>
<tbody>
<tr>
<td>Apples</td>
<td>05/21/2018</td>
</tr>
<tr>
<td>Bananas</td>
<td>05/21/2018</td>
</tr>
<tr>
<td>Bread</td>
<td>05/21/2018</td>
</tr>
<tr>
<td>Milk</td>
<td>05/22/2018</td>
</tr>
<tr>
<td>Meat</td>
<td>05/22/2018</td>
</tr>
<tr>
<td>Chicken</td>
<td>05/22/2018</td>
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</tbody>
</table>
Future Arrivals

Location: Lansing
Time Frame: 4-8 hours
Web Loss page
Future Arrival

<table>
<thead>
<tr>
<th>Product</th>
<th>Exp.</th>
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</thead>
<tbody>
<tr>
<td>Cheese</td>
<td>10/9</td>
</tr>
<tr>
<td>Bread</td>
<td>12/17</td>
</tr>
<tr>
<td>Bagels</td>
<td>10/25</td>
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</table>

<table>
<thead>
<tr>
<th>Product</th>
<th>Exp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>9/18</td>
</tr>
<tr>
<td>Bananas</td>
<td>10/04</td>
</tr>
<tr>
<td>Ham</td>
<td>11/03</td>
</tr>
</tbody>
</table>
Technical Specifications

• iOS and Web APP
  ▪ Used to access and update data

• Gateway Service API
  ▪ Connection point for iOS and Web apps to data

• SQL Database
  ▪ Store all product information for easy query

• Hyperledger Fabric Blockchain
  ▪ Store and distribute data across nodes
  ▪ 3 kinds of nodes – Member, peer, orderer

• DLT Watcher
  ▪ Updates SQL Database when changes are detected
System Architecture

Interfaces

Azure Active Directory

Service Bus

API

Transaction Creator

DLT Watcher

Hyperledger Fabric

Blockchain
System Components

• Hardware Platforms
  ▪ Apple iPhone
  ▪ Computer for Web App

• Software Platforms / Technologies
  ▪ Microsoft Azure
  ▪ Microsoft Azure Blockchain Workbench
  ▪ Azure SQL
  ▪ Hyperledger Fabric Blockchain
  ▪ XCode
  ▪ ASP.NET
  ▪ PowerBI
  ▪ Microsoft Visual Studio
  ▪ VSTS
  ▪ QR Scanning
Risks

• Implementing Blockchain Technology
  ▪ Difficulties in starting up an initial blockchain framework
  ▪ Spinning up a simple 2 node network which will be expanded

• Creating Effective Smart Contracts
  ▪ Creating a contract that will add/edit data to the blockchain
  ▪ Using “Go” to write chaincode to add blocks to blockchain

• Integrating iOS and Web Applications
  ▪ Ability to read data from SQL Database and display
  ▪ Use Azure SQL Server Management Studio to pull queries

• Integrating QR Code Product Tracking Technology
  ▪ QR reading abilities to process product information on device
  ▪ Configuring library to pull correct information from QR code
Questions?