Inventory Management Software

Project Vision

An inventory management website to help small business take inventory. The website is a free and open source software that is easy to use. It is made primarily for startups and small business owners who may not have enough money to purchase an inventory system. The software is intuitive, user-friendly and convenient, and it will enable business owners switch from the old excel spreadsheets with human error to an automated system. IM System does one thing-- take inventory in real time. All the user has to do is scan the barcode and it updates the stock of items in the inventory dynamically with new and existing items. The system will help keep track of what businesses have in stock, since you can only sell what you have readily available; and different business locations can have an updated view of business items. As customers purchase items, the system is being updated with the current stock item, and will send a notification to the business owner to restock if needed. IM System will handle payments through an external party (like PayPal); no mobile app feature, only a webpage that can be accessible on a laptop or mobile phone; large data management and revenue generation are not covered.

Potential Risks

1. Time management(availability) and communication during spring break to still keep the project on schedule
   Risk Exposure: 85% * 8 Hours = 6.8 Hours
   Mitigate via:
   - Agile scrum development
   - Meet once a week to give an overview of progress, challenges and future plans on the project development
   - Software reuse
   - Groupme to communicate, google docs and GitHub for easy collaboration when we could not physically meet.
2. Lack of certain programming language knowledge and skills
   Risk Exposure: 60% * 4 Hours = 2.4 Hours

Over the course of weeks, group members have familiarized themselves with the programming language so it was a little easier to work
   Mitigate via:
   - Personal training and development
   - Take advantage of language libraries in software development
3. Our software is free, open source so all libraries used must be open source
   Risk Exposure: 30% * 4 Hours = 1.2 Hours
   Mitigate via:
   - Thorough search on all libraries to avoid copyright infringement laws
4. Website may not work correctly on certain browsers, such as the UI rendering incorrectly or incompatibility with certain JavaScript libraries
   Risk Exposure: 20% * 6 Hours = 1.2 Hours
   Mitigate via:
   - During testing, we will check the website on various browsers for functionality, and provide users with a recommended list of browsers that will aid in user experience.
5. Data limit on our server

Risk Exposure: 25% * 4 Hours = 1 Hour
        Mitigate via:
- Giving users a certain data amount on the website

Competitors

According to business.org's article 6 best Inventory Management Software, some of the best inventory management systems for small businesses in 2019 are:

- <u>Ordoro,</u> cloud-based website that is relatively cheap compared to other competitors. Its plans are a good fit for businesses that may need shipping abilities like the drop-shipping management feature. IM System does not facilitate shipping for the business owner because the website does just one thing. The IM System is a simple intuitive website to help relieve the business owner from bookkeeping activities by tracking inventory in real time.
- <u>Cin7,</u> cloud-based inventory management offers outstanding customer service by providing videos and articles to provide knowledge on the system's features. Cin7 provides extensive guides and an account manager to help each business owner. Cin7 plans start with $299 per month and they cater to a wide range of business owners--startups to large companies. Cin7 offers a payment portal but the IM System does not have a payment portal but uses a third-party application to automate payments.
- <u>Fishbowl,</u> integrates QuickBooks and Xero for accounting, Amazon for ecommerce. Fishbowl website includes order management, inventory control, warehouse management, and manufacturing. Due to its numerous features, entrepreneurs starting a new venture may find it difficult learning it's tools and taking advantage of its features. The starting price for Fishbowl is $4,395 and increases with each user added. Since Fishbowl does more than inventory management it is more suitable for medium to large business organizations. Unlike Fishbowl, IM System only helps the business owner with inventory management and no costs.

<u>List of inventory management systems with starting price list</u>

Company	Starting price per month
Ordoro	$25
Tradegecko	$79
Unleashed	$85
Veeqo	$200
Cin7	$299
Fishbowl	$366

For a small startup business that may be run be the likes of stay-at home mothers, these prices for inventory systems are certainly high for an entrepreneur with little capital. Our software offers free services to these small businesses for as long as they need them.

1. The website will use JavaScript for most of the work, meaning most smartphones and personal computers can be used, rather than many of the other options which may require dedicated hardware
2. The website can be hosted on the LAN of a business or home, this enables extra security for a small business as well as allowing for the entire system to be hosted without any potential server hosting fees.
3. Because the software will be completely open source, users will be able to audit the software for themselves. This will allow for early detection of bugs, as well as creating extra confidence in the security of their company's private information.

Features

Primary:
- Open source and free to use
  - Users will feel more secure in using the software, while also saving money
- Different style of scanning compared to competitors
  - All scanning will be done using camera on device used to access application.
  - Users do not want to purchase extra equipment if they already have a smart device
- User friendly and Simple
  - Too many buttons and pages can make the software too cumbersome for the user.
- Admin Login System
  - Will allow the owners to control access to the system, and disallow others from modifying the data. Modern security practices will be implemented like passwords for employer and employees--the employer is able to permit certain level of access.

Secondary:
- Usable on any modern browser
  - Accessibility will enable the users to reach a wider audience
- Usable on the LAN
  - For customers who only want to host an inventory system, this provides extra security as well as cost reduction.
- Ability to split products into different bins for easy location lookup
  - Enables the users to have a way of quickly looking up where an items location is in their business

Tertiary:
- Ability to differentiate between different business locations
  - Some entrepreneurs may have multiple small businesses at the same time, this allows for having a one stop access to each of these.

Requirements

	requirement	*why?*	*how?*
1a	Different style of scanning compared to competitors	To provide convenience and ease to the owner. They can pull out their phone anywhere to update inventory or add a new item	Business owners can use any phone with a camera to scan barcodes
1b	Different style of scanning compared to competitors	Small business owners do not need to spend additional funds on a designated hardware for scanning	No additional device is needed, just a mobile phone with access to website and log in
2	Admin Login System	To provide different levels of abstraction for different users	A password login based system for each user, and the business owner is solely able to give authorization to each person
3	User friendly and Simple	To make inventory taking easy to understand and attractive to switch to from old excel spreadsheets	Creating a simple user interface in the website with navigation header, visual branding, and icons
4	Open source	So we can provide a free service to small business owners and startup	Making sure everything used in programming phase is open source, to avoid support through an income stream

Testing Requirements
    The hardest requirement to test is "user friendly and simple" requirement

Requirements	**Testing for requirement**
Different style of scanning compared to competitors	Barcode scanning will work on all modern mobile phone devices with a camera
Admin Login System	Password access needed to login to inventory, try common attack vectors for vulnerabilities

| User friendly and Simple	Send a survey to a diverse group of individuals, ranging from age, socio-economic status and race and have them rate the website based on a list of questions.
Open source	Software documentation indicating its open source, users will be able to audit the software to detect bugs, and all packages used within the project will be verified as open source.

Assumptions and constraints
Assumptions
- We will not pay for our host server
- Our software is not customized for businesses like catering industry
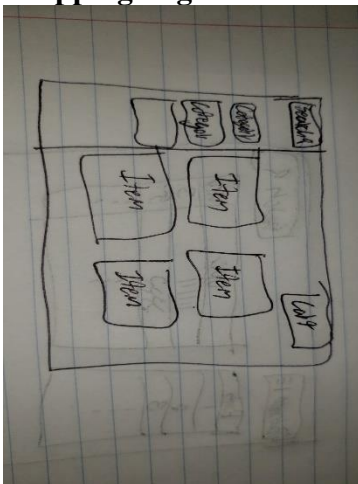- Access to Local Area Network

Constraints
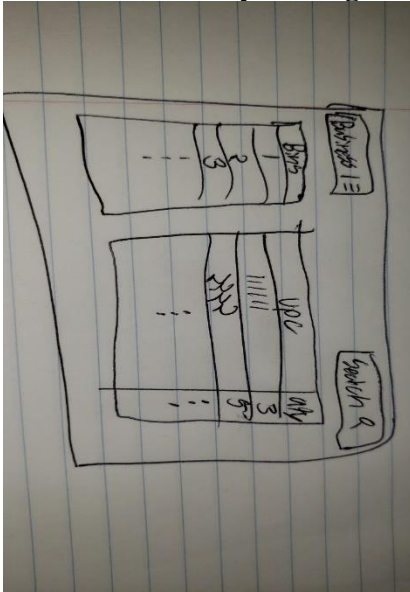- Since we are not paying for the server, only a limited amount of people can use our software

UI Prototype
Inventory Scanning:
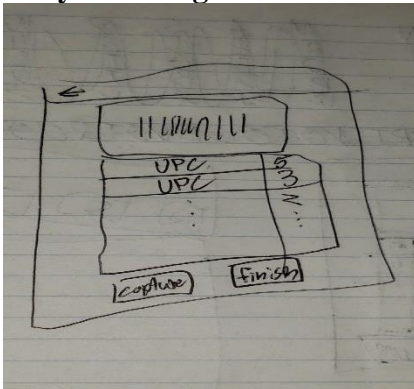
Shopping Page:

Website Inventory Management:

Specification and Design

Use case story

Name	Scan Barcode
Primary actor	Business owner/employee
Stakeholders and interest	business owner or employee: wants to scan the barcode of an item quickly with minimum errors; wants to update the quantity in the inventory, each item has its own bin with a unique barcode and quantity.
Preconditions	1. The item is identified 2. The device used for scanning has to be turned on and working correctly
Postconditions	1. The device scans the item 2. The inventory is updated

Main success scenario	1. The device scans the item successfully 2. The system records the new quantity in each bin, and displays a message indicating this current quantity 3. The system prompts the user to scan new item. If the user says yes, it continues, else, it goes to the first default page

Extension	a. If the scanner scanned the barcode of an item and it was not identified in the system:
	    1. System prompts user to re-scan and check the the barcode for any defect
	    2. After re-scanning, the system prompts the user to create a new bin that will include the new item
	    3. The system updates the inventory
	*b. At any time, System fails:
	    1. To support recovery and correct the inventory system, ensure all operations can be recoverable for any step of scenario.

| Name	Search Item
Primary actor	Business owner/employee
Stakeholders and interest	business owner or employee: wants to quickly search for an item in the system with its location and the quantity
Preconditions	1. To search for an item, type the barcode number in the inventory system 2. The item has to be in one of the bins in the inventory
Postconditions	The system will provide details about the item and its location
Main success scenario	1. The system found the item successfully 2. The system prompts the user to start another search

Extension	a. If the system could not find the item in the inventory:
	  1. System prompts user to ensure the barcode is accurate and re-type the barcode is not
	  2. The IM system rechecks the inventory for the item
	  3. If the item could not be found, the system displays a message prompt indicating item could not be found.

Name	Deleting Item
Primary actor	Business owner/employee
Stakeholders and interest	business owner or employee: wants to remove an item from the inventory with each bin there are many items. After removing the item, update the quantity in the inventory.
Preconditions	1. The item is identified 2. The quantity of that item has to be at least one
Postconditions	The inventory is updated by deducting the quantity of the item selected.
Main success scenario	1. Selected item is removed successfully 2. The system recorded the new quantity (after removing the item/items) from the bin 3. The system is ready for removing another item if wanted

Extension	a. If the system did not find the item that supposed to be removed:
	  1. System prompts the user (owner) to make sure the barcode to the item to be removed is correct
	  2. The IM system rechecks the inventory for the item to be deleted
	  3. If the item could not be found, the system displays a message prompt indicating item could not be found and can not be removed.
	*b. At any time, System did not deduct the number of items in the inventory:
	  1. To support recovery and correct the inventory system, ensure all operations can be recoverable for any step of scenario.

Name	Update Item Description
Primary actor	Business owner/employee
Stakeholders and interest	business owner or employee: wants to update item in the inventory system. Has options available to update either the name, description, barcode or bin
Preconditions	Item has to exist in the system with all required information (like barcode, bin and name)
Postconditions	Item is updated in the system and the owner gets a prompt that the item is updated with its new information
Main success scenario	1. The system finds the item to be updated 2. The system prompts the user with a dialogue box to edit the item's name, description. 3. The user clicks done, the system shows a message indicating the item was updated.

Extension	a. If the system did not find the item to be updated:
	    1. System prompts the user to make sure the name or current barcode of the item to be updated is accurate
	    2. The IM system rechecks the inventory to see if the item to be updated is in the system
	    3. If the item could not be found, the system displays a message prompt indicating item could not be found and can not be updated.
	*b. At any time, System did not update the item in the inventory:
	2. To support recovery and correct the inventory system, ensure all operations can be recoverable for any step of scenario.

Name	Sell Item
Primary actor	customer
Stakeholders and interest	Business owner or employee: wants to use 3rd party system to make payments and update quantity in the IM system after item is bought. Customer: customer is able to pay for item on the website
Preconditions	Item has to exist in the system
Postconditions	Item is paid and quantity is updated and the owner gets a prompt that the item has reduced in quantity
Main success scenario	1. The customer selects the item to be bought 2. Payment operation is transferred to a 3rd party portal 3. Once payment has been made, the website displays a message to the customer that item was bought 4. the inventory is decremented with an updated quantity on the item, and sends a message to the owner 5. If the customer bought the last item, an alert is sent to the owner with a notification to update item which is no longer available
Extension	*a. At any time, System did not deduct the number of items in the inventory: 1. To support recovery and correct the inventory system, ensure all operations can be recoverable for any step of scenario.

Website Use-Case diagram
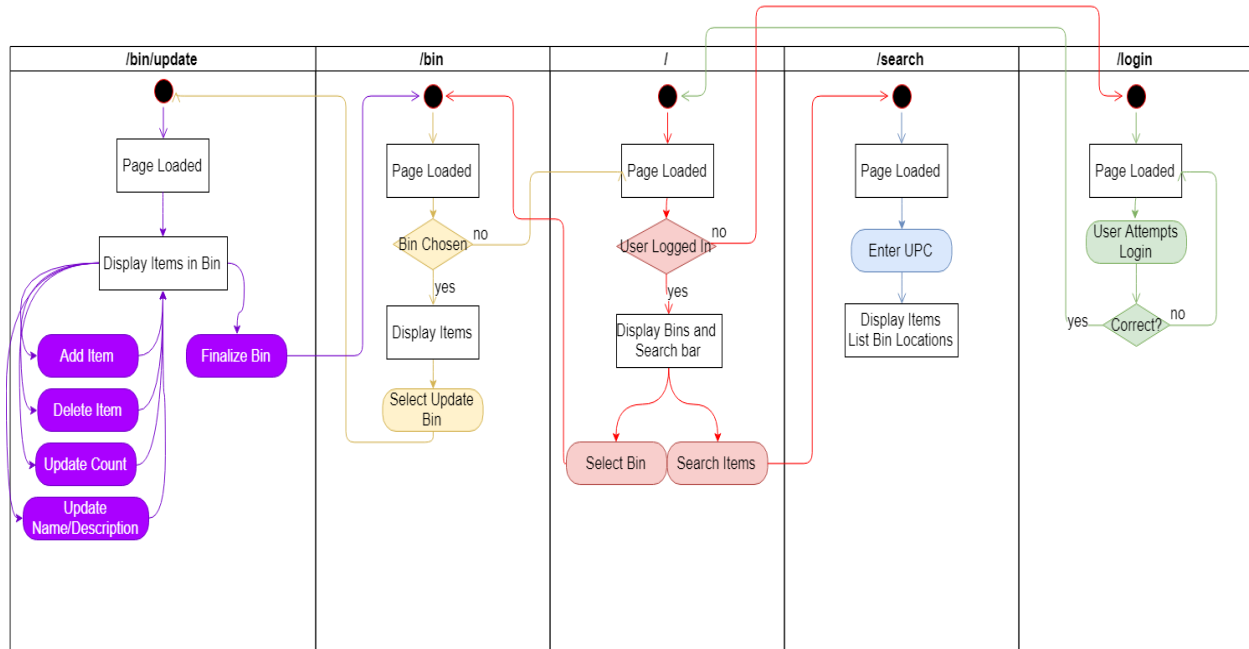
- **/bin/update:** Page includes all features related to updating bin information and current items
- **/bin:** Lists all items currently located within a bin
- **/:** Default landing page for the Inventory Management system, will redirect for login and provide interface for searching
- **/search:** Based on UPC searched for it will display all item bin locations and their quantities
- **/login:** Will provide login service, on successful login attempt will update session to allow access to all other feature

Code and Testing
   Testing
- Multiple Node JS packages which provide great code coverage and simple implementations will be used for testing.
- Mocha, Supertest provide functionality for running tests as well as testing HTTP requests.
- Chai provides an assertion library that makes tests simpler to understand and are less error prone.
- Husky and Lint-Staged allow tests to be run every time a commit is made, this ensures that if something fails to work it will not be added to the code base.
- Manual Tests can be done by running 'npm run test'

Software Development Plan
- **Iteration Plan**
  - Iteration 1: the first iteration will be getting the underlying technology stack in place to allow for integration of the UI and backend services.
  - Iteration 2: login and registration, API (complete backend), basic UI for frontend,
  - Iteration 3: complete UI, barcode scanning, system primary requirements (everything that needs to be done is done), and hallway testing(create a survey and rating system to get feedback from people)
  - Final Deliverable: testing, additional requirements are added based on priority.
- **Tools**
  - Programming application: JavaScript, MySQL, HTML, CSS, bootstrap, NodeJS
  - GitHub for collaboration: https://github.com/uta-cse-3311/inventory_management
  - Cloud: amazon web service
  - Agile Scrum software development: implementation and unit testing
- **People**
  - Members of CSE 3311 Team 10
  - Review Team 11
  - Professor Christoph Csallner and TA Soumik Mohian
- **Education**
  - Members have a foundational knowledge of programming and computer science, but education is needed on the some of the languages being used.
- **Licensing**
  - The MIT license will be used for the project as it allows for free use to anyone, but bars any liability and warranty requirements from the project group.

Glossary

Bin: Inventory storage location that contains multiple 'Item'. Can have a Name and Description.
Item: Contains the UPC and Quantity of an Item within a Bin. Only one of a UPC can be in a Bin.

References

"6 Best Inventory Management Software of 2019." *Business.org*, Business.org, 16 Jan. 2019,
www.business.org/finance/cost-management/best-inventory-management-software/.