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| CMPT370 - GROUP 02 – FALL 2013 | | | | |
| Milestone 4: Warehouse Management System | | | | |
| Requirements and Preliminary Design | | | | |
|  | | | | |
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| **10/27/2013** | | | | |

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1. **Summary Use Cases**

**Use Case Name**: Statistics Reporting

**Level**: Summary

**Actors**: Manager

**Goal**: Provide a high level view of warehouse operations, to drive efficiency gaining decision making

**Activities**: Analyze staff efficiency for promotion and layoffs, view turnover speed of specific products to guide purchase order and discount sales decisions, gauge warehouse stock level

**Quality**: high quality, fast, accurate, and reliable

**Version**: September 28, 2013

**Use Case Name**: Stock Reporting

**Level**: Summary

**Actors**: Manager

**Goal**: Provide in depth view of information about warehouse stock

**Activities**: Monitor stock levels, view stock information for all products currently or previously contained in the warehouse

**Quality**: high quality, fast, accurate, and reliable

**Version**: September 28, 2013

**Use Case Name**: Routing Stocking Tasks

**Level**: Summary

**Actors**: Stock Handler

**Goal**: Increase efficiency of navigating the warehouse for stocking tasks

**Activities**: Putting away stock that has been received, gathering stock for an upcoming shipment, building pallets correctly

**Quality**: high quality, accurate, reliable, and effective

**Version**: September 28, 2013

**Use Case Name**: Receive Purchase Order

**Level**: Summary

**Actors**: Receiver, Stock Handler

**Goal**: Add new stock items to the system

**Activities**: Recording information on newly received stock, increasing warehouse stock level to correspond to received shipments, assign Stock Handler to store the product

**Quality**: high quality, accurate, high ease of use, reliable, flexible

**Version**: September 28, 2013

**Use Case Name**: Send Shipments

**Level**: Summary

**Actors**: Shipper, Stock Handler

**Goal**: Send the items ordered for shipment from the warehouse

**Activities**: Remove stock from the warehouse, track pallet contents, record progress of Stock Handlers in gathering items required for shipment.

**Quality**: high quality, accurate, high ease of use, reliable, flexible

**Version**: September 28, 2013

**Use Case Name**: Locating Stock

**Level**: Summary

**Actors**: Manager, Stock Handler

**Goal**: Find the location of stock within the warehouse

**Activities**: Locate stock for shipment, locate old stock location to store recently received stock of the same item, view map of warehouse to find location of the stock

**Quality**: high quality, reliable, efficient

**Version:** September 28, 2013

**Use Case Name**: Locate Stock

**Level**: Summary

**Actors**: Stock Handler, Manager, Shipper, Receiver

**Goal**: Find stock location within the warehouse

**Activities**: Find the location of the stock within the warehouse using the GUI to click on the overhead map to view the products in each bin, display location on stock reports, search using the main screen of the GUI by item number or name to highlight on the GUI the location of the stock. Display stock location when the shipper creates shipping tasks.

**Quality**: high quality, very accurate and reliable

**Version**: October 8, 2013

**Use Case Name**: Modify Inventory

**Level**: Summary

**Actors**: Receiver, Manager, Loss Prevention, Stock Handler

**Goal**: Add and correct stock information

**Activities**: Add new item information to the system, which would include name, description, item number, category, price, quantity, and location. Alter the quantity of a stock item, in the case of a lost, damaged, or stolen item. Change the location of the item in the warehouse when it has been moved. Remove an item from the system if it has been discontinued or will no longer be carried by the warehouse.

**Quality**: high quality, high ease of use, reliable

**Version**: October 8, 2013

**Use Case Name**: Order Stock

**Level**: Summary

**Actor**: Stock Handler, Manager

**Goal**: if the a product inventory level is low, the Stocker Handler will make order for it.

**Activities**: Once the stock Handler find the quantities of product is limited during they gathering the product in the warehouse, they will decide to the order more product to avoid it out of stock. it will report to the management and reporting system and appear in the purchase order list. it has the item number, item name, item quantities and estimate supply arriving date.

**Quality**: high quality, high ease of use, reliable

**Version**: October 10, 2013

**Use Case Name**: Login

**Level**: Summary

**Actor**: Stock Handler, Manager, Shipper, Receiver

**Goal**: it is the system access privilege

**Activities**: In the login user interface, it has two text fields. the first one is for username , the second one is for password. In the bottom, there is a login button. Everyone has their own username and password for the warehouse management system. For instance, the shipper can access to the shipping system, stocker Handler can access the stock handler user interface. Manager has the supervisors account to access the whole system. the system used by warehouse staff and other people can not using it. This make sure the firm trade secret is protected.

**Quality**: high quality, high ease of use, reliable

**Version**: October 10, 2013

**Use Case Name**: Manage Employees

**Level**: Summary

**Actor**: Manager

**Goal**: a employee working status report

Activities: it tracks the workers about who is doing what, the spot of employees and the upcoming working events. It is a status report to indicate their current working condition. For example, if a stock handler is looking for a product, it will appear "look for product" in the list. if the employee did not come to work today, it will appear "day off". Also it will refresh the list automatically, such as every 5 minutes up to date the information.

**Quality**: high quality, high ease of use, reliable

**Version**: October 10, 2013

1. **Fully-Dressed Use Cases**

**Scope**: Make shipment

**Level**: user goal

**Primary Actor**: Shipper

**Stakeholders and Interests**:

\* Shipper: Wants to check the shipment required then assign tasks to stock picker and shipping company

\* Stock Picker: Wants to know the latest picking requirement

\* Shipping Company: Wants to know the information of the shipping requirement, including name, weight, volume and destination

\* Manager: Wants to know what product has been shipped.

**Preconditions**: Shipper is identified and authenicated

**Success Guarantee**: The shipmen task is assigned to a stock picker and a shipping company. The shipping record is saved.

**Main Success Scenario**:

1. Shipper starts the system.

2. Shipper checks all the shipment requirement.

3. Shipper choose a shipment requirement.

4. Shipper input the way-bill number and delivery time.

5. Shipper assign the shipment task to a shipping company.

6. Shipper assign the picking task to a stock picker. Let the stock picker carries the products to the shipping company.

7. System tell shipper the operation is finished.

8. System save the shipping record and input it into database.

9. Shipper leaves the system.

**Extensions**:

At any time, Shipper can check the future shipment requirement but do not assign it the shipping company immediately.

**Special Requirement**:

Because the database updates all the time, The list of shipment requirement need be refreshed automatically every 1 minutes.

**Technology and Data Variations List**:

\* Shipper choose the requirement, stock picker and shipping company by click mouse.

\* Shipper input the way-bill number and delivery time by keyboard.

\* The form of way-bill number is a sisteen digits.

\* The form of delivery time is yyyy/mm/dd, e.g. 2013/10/25.

\* Stock pickers and shipping companies are identified by name.

**Frequency of Occurrence**: Could be nearly continuous.

**Open Issues**:

\* What if the shipment need be canceled or changed?

**Name**: Locate Stock

**Scope**: Stock Handler

**Level**: Subfunction

**Primary Actor**: Stock Handler

**Stakeholders and Interests**:

Stock Handler, Manager, Shipper, Receiver: Find stock location within the warehouse

**Preconditions**:

1. A Warehouse map has been coded into the GUI that is synonymous with the actual warehouse.
2. Locations of stock are accurately positioned
3. The warehouse’s floor changes have been recording in the system
4. The person knows information about the item they are looking for

**Main Success Scenario**:

1. The person looking for an item enters in the inventory number into the map system.
2. They are given a location number and/or a map to pinpoint that items location in the warehouse. They are also given the name of the item to avoid typos.

**Extensions**: Failure path:

1) The item number they are looking for is incorrect, returns different location but also returns information on the item searched

2) Item does not currently have a location. The program returns an error message as well as the kwon information about that item

**Special Requirements**: None.

**Frequency of Occurrence**:

New employees: Very Often (>30 times per day). New employees have no orientation of the warehouse. This tool will help them get acquainted with their surroundings.

Seasoned employ: Daily. Depending on the person and experience this system is likely to be used a few times a day or week.

**Miscellaneous**: The user should also be able to browse the locations manually. They might vaguely remember an item and need a piece of information to jog their memory.

**Name:** Login the warehouse system

**Scope:** Warehouse Management System

**Level:** User Goal

**Primary Actor:**

1. Manager

2. Shipper

3. Receiver

4. Stock Handler

5. Manager of Grocery Store

**Stakeholders and Interests:**

1. Managers of warehouses:

login to update the database and monitor the status of the warehouses

2. Shipper of warehouses:

login to update the shipping information

3. Receiver of warehouses:

login to update the goods information

4. Stock Handler of warehouses:

login to manage the goods

5. Managers of grocery stores:

login to monitor the status of the warehouses

**Preconditions:**

1. Users already has the application system launched

2. Users already has account registered

3. Users enter valid username and password

4. Users has valid permission to login the system

**Success Guarantee:**

1. The user name and password must be correct

2. The user has valid permission to login the system

**Main Success Scenario:**

Users enter the correct user name and password

**Extensions:**

1. Users enter a wrong user name

2. Users enter a wrong password

3. Users enter a wrong user name and a wrong password

4. The database does not record the information of users

5. Users do not have valid permission to login the system

**Special Requirements:**

1. Animation of pop up window.

**Technology and Date Variations List:**

1. Touch screen digital keyboard

2. Verified code

**Frequency of Occurrence:**

1. Testing case of entering wrong user name

2. Testing case of entering wrong password

3. Testing case of entering wrong user name and password

4. Testing case of user did not register in the system

**Miscellaneous:**

1. The login window doesn't show up when user login in

**Name**: Routing Stocking Tasks

**Scope**: Stock Handler

**Level**: Subfunction

**Primary Actor**: Stock Handler

**Stakeholders and Interests**:

Manager - Desires Stock Handlers to be as efficient as possible, that they not attempt any actions that are impossible to complete (not enough space, stock not available for an order)

Receiver - Have products put away as quick as possible, ensure that all items are able to be put inside the warehouse

Shipper - Have products gathered quickly and efficiently, as a well formed pallet (not top heavy) and with all the items required for the order

Stock Handler - Handle tasks as quickly and easily as possible, without errors or backtracking on the warehouse floor

**Preconditions**:

1) Stock has been received by the Receiver, is sitting at the warehouse entrance, and is ready to be placed into bins in the warehouse for storage

2) Order has been received and all stock required for the order is within the warehouse

**Success Guarantee**: Most efficient route has been located, items are ordered by their 1) destination within the warehouse order or 2) destination within the warehouse for pickup

**Main Success Scenario**:

1) After receiving items, receiver sends the purchase order manifest to this subfunction, items in the list are checked for a current location within the warehouse and assigned a bin to be placed in (with the old stock if it exists, otherwise a closest location), stock is not routed to be added to a bin that is already full, or that it will not fit in, the order of the items is returned to another subfunction that will create a printable plan for the Stock Handler

2) After receiving an order that needs to be shipped, the shipper send the shipment manifest to this subfunction, items in the list are checked to confirm they are in the warehouse and their current location is recorded, if there are multiple locations for a product, they are both recorded, and a route is planned that will take into account the weight of the items being gathered (heaviest first), and the location of the items throughout the warehouse

**Extensions**: Failure path:

1) Unable to store the items in the warehouse due to lack of space, return an error message to notify the user, do not return a list of items

2) Unable to locate all the items required for the shipment, return an error message to notify the user, do not return a list of items

**Special Requirements**: Must not specify that the stock be stored in a bin that it does not fit.

Technology and Data Variations List: Two types of input, 1) List of items to be stored, 2) list of items to be retrieved.

Output is the sorted list of items that were entered, sorted in the order that they should be handled

**Frequency of Occurrence**: Multiple times

**Miscellaneous**: None

**Use case name**: Manage Employees

**Scope**: Warehouse system

**Level**: User Goal

**Primary Actor**: Manager

**Stakeholders and Interested**:

Manager: Want to know the currently stuff including Shipper, receiver and stock picker working condition

Stock Handler: report working status and schedule.

Shipper: report working status and schedule.

Receiver: report working status and schedule.

**Preconditions**: manager has the authenticated

**Success guarantee**:

The employees working condition is reported and stored in the system.

Assigned work tasks allocate effectively

Manager's adjustment task schedule is saved

**Main Success Scenario**:

1. Manager starts the management system

2. Employees instantly report their working status and schedule regularly and it stored in the database.

3. System immediately updates shipper, receiver and stock picker working status and schedule

4. Manager checks all the employees' status in the management and reporting system

5. System return employees' status listing

6. Manager decide the personal adjustment. For instance, Manager can transfer the shipper department to receiver department. Then send command into system and it saved in database.

7. System sends work tasks detail to employees

8. Employees report received work tasks to system and it saved in database

9. System updates and display a message about employees known work tasks

10. Manager and employees exit management and reporting system

**Special Requirement**:

Employees need to report their working status and schedule once they finished their current work or start their new work category

The list of employees' working status need be refreshed automatically every 5 minutes.

**Technology and Data Variations List**:

There are three kinds of work status busy, leisure and day off

All employees update their working schedule every 5 minutes

The form of work time is 24-hour e.g. 21:00

**Frequency of Occurrence**:

Manager uses the management employees function hourly

Especially, when all employees are busily engaged or some department are underhanded

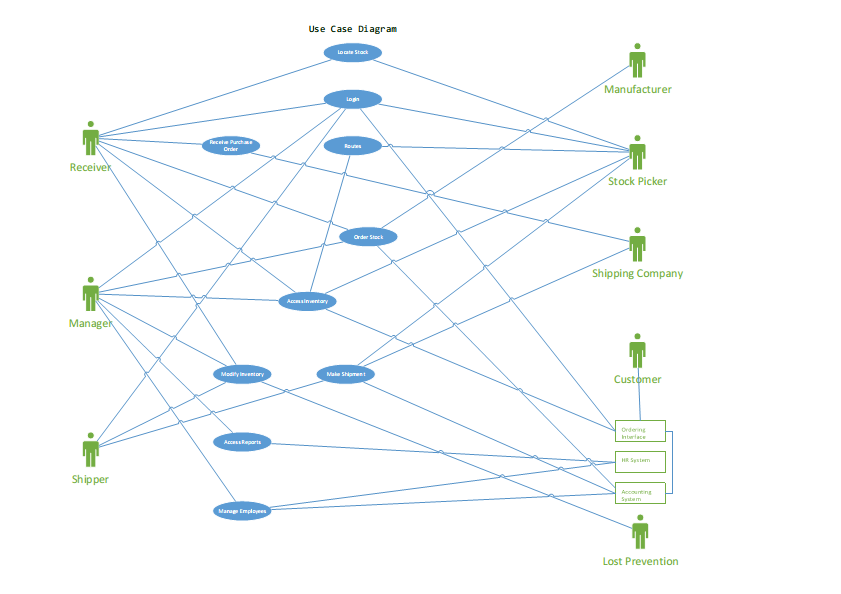
**Issue**:

How to get the employees accurate schedule and their working time. It is difficult to gather

1. **Supplementary Specification**

<<TODO: NO ONE YET ASSIGNED>>

1. **Use Case Diagram**



1. **Domain Model**

**<<**TODO: BY SAM>>

1. **Glossary**

Forklift – A machine with a “fork” on the front, can be used to lift heavy pallets high into the air

Pallet – A wooden platform for placing products on, commonly used in a warehouse to bundle products for shipment and moving the products using a forklift

Purchase Order – A pallet containing products that have been ordered by the warehouse

Shipment – A pallet that will be sent via truck to its destination

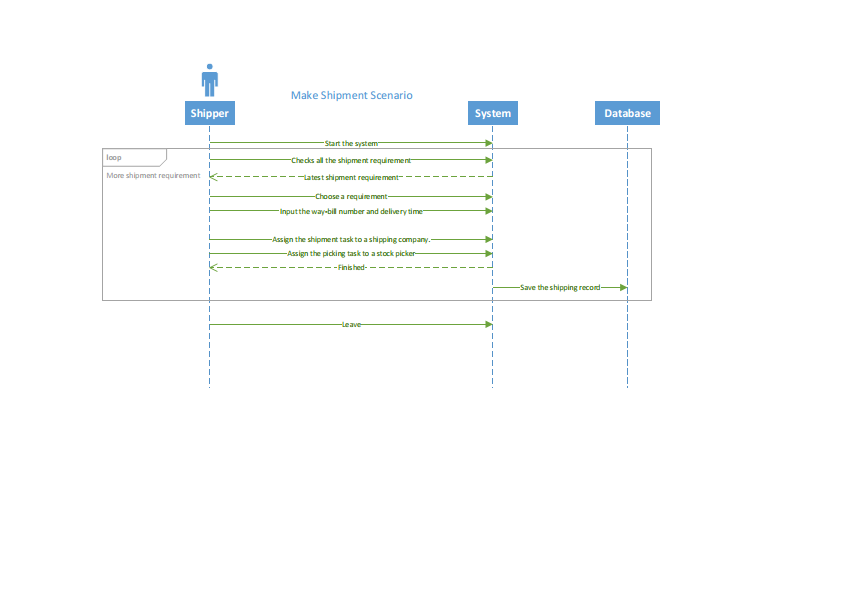
Shipper – An employee who plans and prepares shipments to be sent to the purchaser

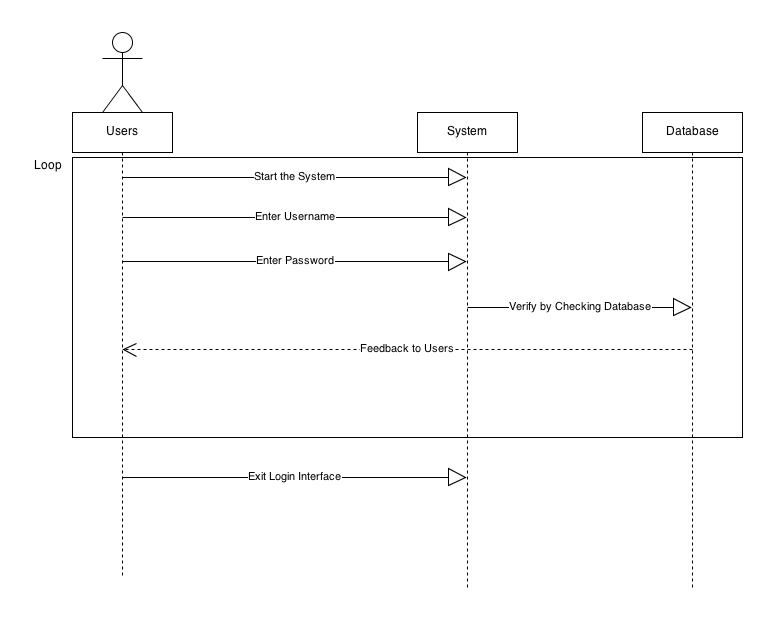
Stock – A product or item that can be bought by customers

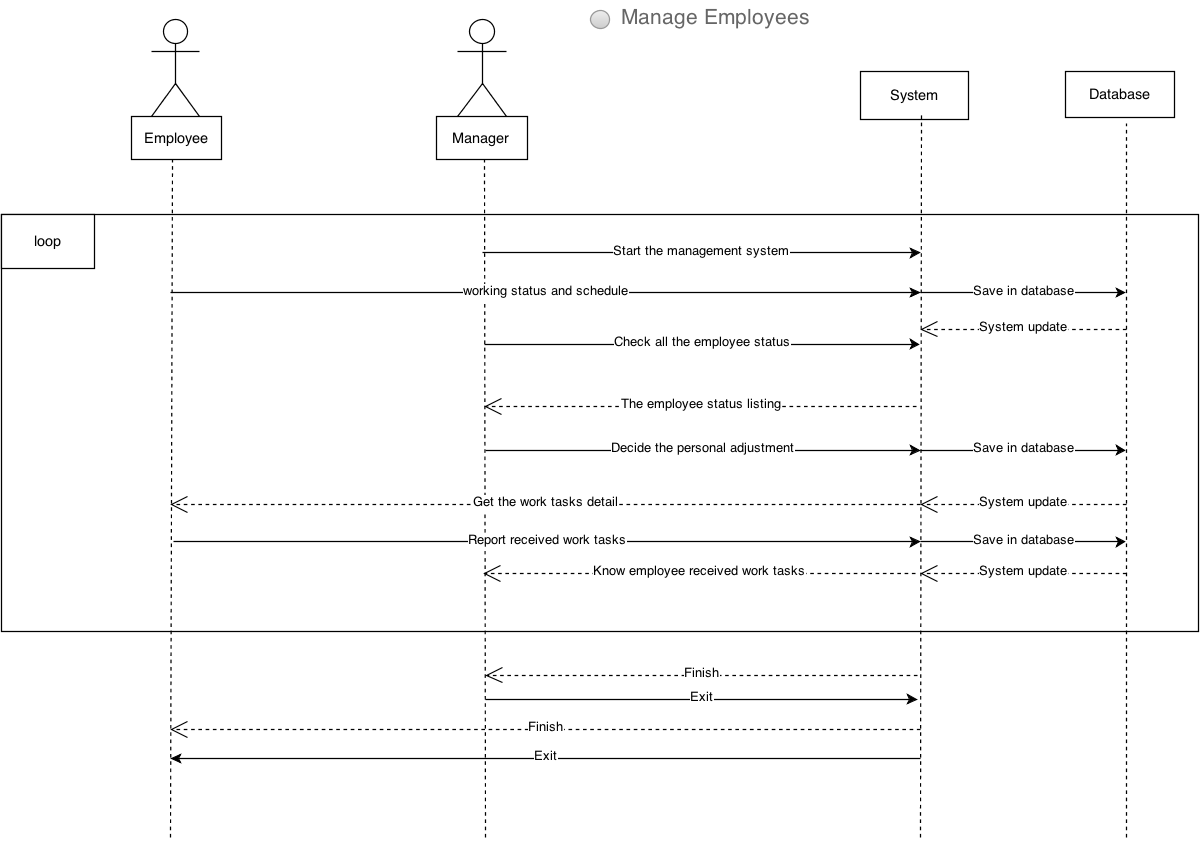
Stock Handler – An employee, who puts stock items inside the warehouse when they have arrived for storage, and gathers stock items for shipment when they have been purchased

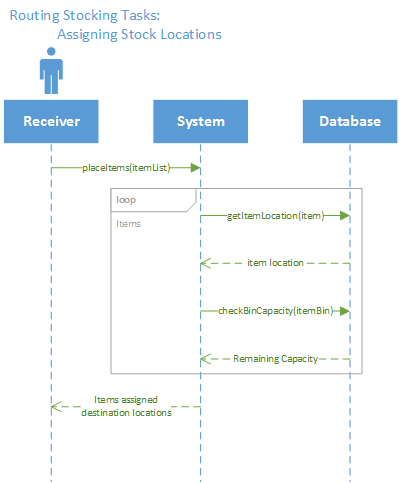
Receiver – An employee who records and tracks all incoming shipments to the warehouse

1. **System Sequence Diagram**



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<<TODO: BY SPENCER>>

1. **Operation Contracts**

**Operation**: checkShipRequire()

**Cross References**: uses cases: NIL

**Preconditions**: NIL

**Postconditions**:

\*All shipment requirements are listed in user interface.

**Operation**: assignTask()

**Cross References**: uses cases: check Shipment Requirement

Preconditions: At least a stock picker is available.

At least a shipping company is available.

**Postconditions**:

\* All shipment requirements are listed in user interface.

\* A shipment requirement S is choosen.

\* Way-bill number is assigned by user input.

\* Delivery time is assigned by user input.

\* S is distributed to a shipping company

\* The picking task is distributed to a stock picker.

\* The shipping information is recorded.

<<TODO: BY SAM>>

**Operation**: checkEmployeeStatus()

**Cross References**: uses cases: NIL

**Precondition**: Employees report their woking status and schedule to the system and stored in database

**Postconditions**:

All employees status are listed in user interface, management and reporting system, it indicates what are employee doing and what are they going to do

**Operation**: AssignPersonalAdjustment

**Cross Reference**: use cases: check employee status

**Precondition**: one or more stock handler is available

one or more shipper is available

one or more receiver is available

**Postcondition**:

new work tasks are assign to leisure employees

decrease busy employees working pressure

employee may cross department to solve trouble

the unprocessed working tasks are less

Improving the work efficiency

and increase the amount of total completion of work

**Operations**: checkBinCapacity(itemBin: binID)

**Cross References**: use cases: Routing Stocking Tasks

**Preconditions**:

itemBin instance b exists

b exists within the set of bin ID's

**Postconditions**:

ItemList instance iL was created

Item instances i[] were created

i associated with item instance j from database

Float instance sum was created

sum became i[].size

**Operations**: getItemLocation(item: productID)

**Cross References**: use cases: Routing Stocking Tasks

**Preconditions**: Item instance i exists

**Postconditions**:

Integer instance n was created

n was associated with Bin ID instance b from database

<<TODO: BY SPENCER>>

1. **Implementation**
   1. **Running Prototype**
   2. **Implementation of Two Primary Success Scenarios**
   3. **Skeleton Implementation**
   4. **User Manual/ReadMe File**
2. **Project Plan**