

# **Logic University**

## **Stationery Store Inventory System**

### **(SSIS)**

**Final Report**

**Presented By: Team 5**

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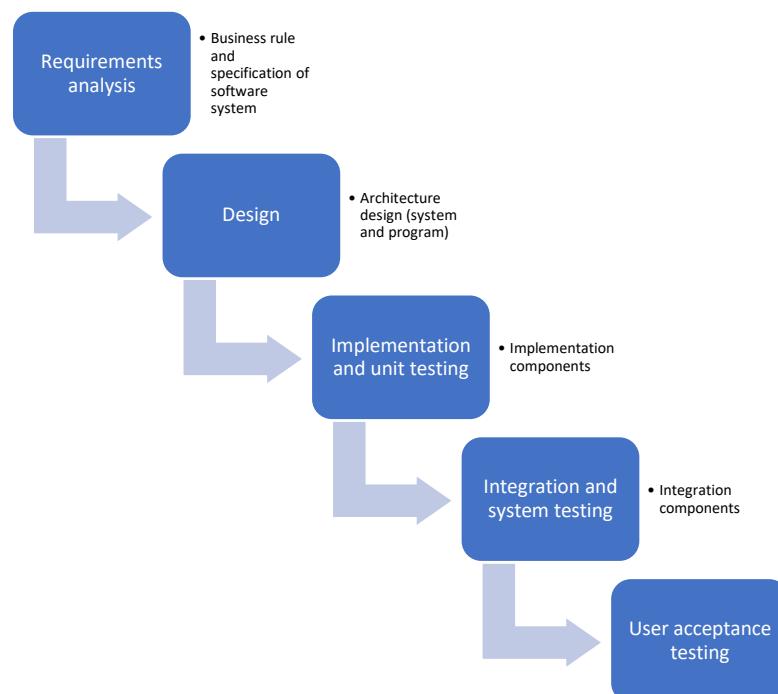
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## 1. INTRODUCTION

The aim of this project is to assist the Stationery Department in going paperless by digitalising the LOGIC University Stationery Store Inventory System (SSIS). This system is expected to help the department manage the University's stationery supplies, produce reports for management and streamline the functions for internal requisition and disbursement, as well as external purchase orders. It is designed with ease-of-use in mind, and has an add-on mobile application feature for mobility.

Waterfall modelling is applied for our Software Development Life Cycle. The chart below shows the waterfall cycle. The group met with the users during the Requirements Analysis stage and User Acceptance Testing Stage.



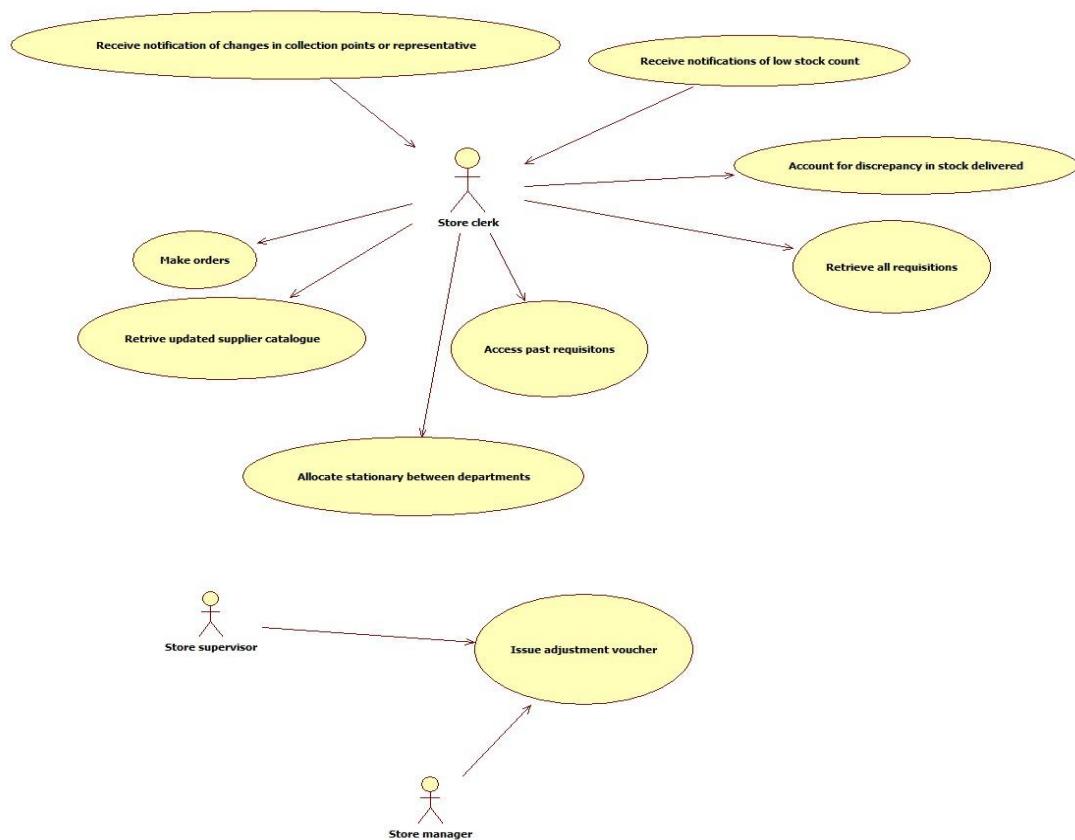
Utilising our resources of 7 people (6 in the final week as one could not complete the project), we took a period of 1 month to develop this application.

## 2. PRODUCT DELIVERABLES

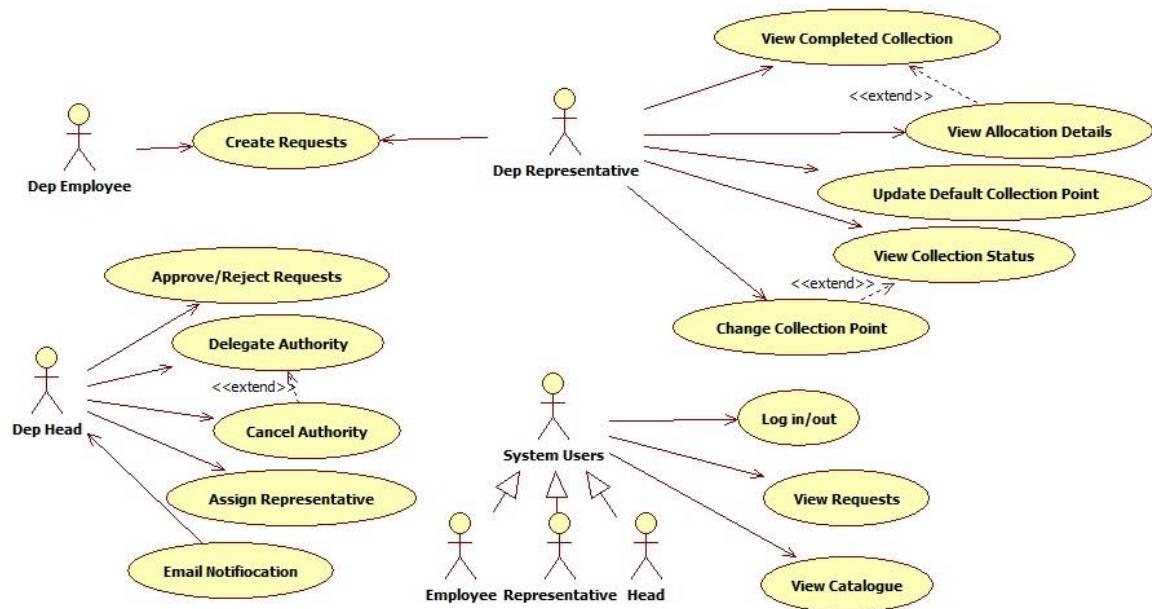
### 2.1 FUNCTIONAL REQUIREMENTS

#### 2.1.1 USE CASE DIAGRAM

##### 2.1.1.1 STORE USE CASE DIAGRAM



### 2.1.1.2 DEPARTMENT USE CASE DIAGRAM



### 2.1.2 USE CASE NAME AND DEFINITION

	<b>Use Case Name</b>	<b>Description</b>
1	Make Orders	Store Clerk creates purchase order when items goes below the reorder level or in any event when departments require to order huge amount of items
2	Retrieve updated supplier catalogue	Store Clerk is updated on the items available to order from each supplier
3	Allocate stationery between departments	Store Clerk is transfer allocated quantity to department with high priority
4	Access past requisitions	Store Clerk can search for past department requests
5	Retrieve all requisitions	Store Clerk can search for all past and present requests
6	Account for discrepancy in stock delivered	Store Clerk to edit quantity when there is difference in quantity ordered and quantity delivered
7	Issue adjustment voucher	Store Clerk to create adjustment voucher when there is discrepancy in stock level in store
8	Create Requests	Dep. Employees/Representatives can create requests for stationery items
9	View Completed Collection	Dep. Representative can view stationery that has been collected
10	View Allocation Details	Dep. Representative can view who to transfer the collected stationery to
11	Update Default Collection Point	Dep. Representative can change the default collection point to pick up stationery
12	Change Collection Point	Dep. Representative can do a one-time change to a collection point to pick up stationery
13	View Collection Status	Dep. Representative can view stationery which is ready to be picked up
14	Log In/Log Out	All users are able to login from the same login page, with functionalities defined by their roles
15	View Requests	All in department can see the department's existing requests
16	View Catalogue	All in department can see the stationery store's list of items available for order.

### 2.1.3 USE CASE PACKAGES



### 2.1.4 ACTORS AND DESCRIPTIONS

Actor	Description
Manager	Store Manager oversee the store department. Purchase order and adjustment voucher(>\$250) goes through the manager.
Supervisor	Store Supervisor is the second in command after Store Manager however has lesser authority than Store manager
Clerk	Store clerk operates the store. Process purchase order and requisition orders, and deliver orders to collection points.
Department Head	Department Head approves all requisition raised by employees, and assigns department representative
Department Representative	Department Representative is an employee that's assigned to collect requisition orders deliver by store clerk.
Employee	Employee raise requisition order for department.

## 2.2 NON-FUNCTIONAL REQUIREMENTS

### 2.2.1 REQUIREMENT SPECIFICATION

#### 2.2.1.1 USER VOLUME TABLE

*User Volume Table* consists of the group of users of the system, location of users which allows us to determine the required number of client machines, database and software licenses.

User Group	Country / Location / Count	Remarks
Stationery Store Manager	Singapore / Logic University / 1	Stationery Store Manager stationed at the store office, only needs to validate adjustment voucher when cost is high. The manager does not need to use the system frequently.
Stationery Store Supervisor	Singapore / Logic University / 1	Stationery Store Supervisor stationed at the store office, needs to validate all low cost adjustment vouchers. Needs to use system a bit more than manager, but not frequently.
Stationery Store Clerk	Singapore / Logic University / 3	Clerk is stationed at the store office, frequently needs to use the system for their everyday work.
Department Head	Singapore / Logic University / 10	Heads are stationed at their respective department offices, will sometimes need to access the system to approve orders.
Department Employee / Representative	Singapore / Logic University / 500	Employees are stationed at their respective departments, will sometimes need to access the system on a weekly basis.

### 2.2.1.2 USE CASE TRANSACTION VOLUME TABLE

*Use Case Transaction Volume Table* determines the maximum load the system can withstand for each use case transaction.

Use Case	Criticality	No. of Users	Transaction Information	Concurrently Important Activities
<b>Login</b>	Critical	505	20 per week	2
<b>Create Purchase Order</b>	Critical	3	20 per month (2 per month * 10 suppliers)	1
<b>Update Purchase Order</b>	Low	3	5 per month	1
<b>Create Adjustment Voucher</b>	Low	3	5 per month	1
<b>Retrieval List</b>	Moderate	3	1 per week	1
<b>Generate Order Trend Report</b>	Moderate	5	6 per month	1
<b>Update Collection Time</b>	Low	3	5 per year	1
<b>Approve Purchase Order</b>	Critical	1	20 per month per user	1
<b>Approve Adjustment Voucher</b>	Moderate	2	5 per month per user	1
<b>Store Delegate Authority</b>	Low	2	2 per year per user	1
<b>Maintain Supplier</b>	Low	1	2 per year per user	1
<b>Upload Bulk Supplier File</b>	Low	1	1 per year per user	1
<b>Create Requisition</b>	Critical	490	5 per week per department	3
<b>Update Requisition</b>	Low	490	2 per month per department	1
<b>Update Disbursement Status</b>	Moderate	10	1 per week per department	2
<b>Update Collection Point</b>	Low	10	1 per year per department	1
<b>Approve Requisition</b>	Critical	10	5 per week per department	2
<b>Assign Department Representative</b>	Low	10	1 per year per user	1
<b>Department Delegate Authority</b>	Low	10	2 per year per user	1

### 2.2.1.3 ENTITY VOLUME TABLE

*Entity Volume Table* describes the maximum data storage requirement for target volume throughout the retention period.

Entity Class	Source Document	Retention Period	Target Volume
<b>Employee DB</b>	Employee List	5 Years ^	3 GB (Records of 500 employees)
<b>Department DB</b>	Department List	N/A	50 MB
<b>Stock Card DB</b>	Stationery Catalogue, Stock Card	N/A	100MB (Records of 90 stationery items)
<b>Stock Info DB</b>	Stock Status	N/A	50 MB
<b>Supplier DB</b>	Supplier Info List	5 Years ^	50 MB
<b>Supplier Catalogue DB</b>	Supplier List	5 Years ^	50 MB
<b>Collection Point DB</b>	Disbursement List	N/A	50 MB
<b>Order DB</b>	Stationery Purchase Order Form	5 Years ^	500 MB
<b>Order Details DB</b>	Stationery Purchase Order Form	5 Years ^	1 GB
<b>Order Status DB</b>	Order Status List	N/A	50 MB
<b>Adjustment Voucher DB</b>	Inventory Adjustment Voucher	5 Years ^	500 MB
<b>Adjustment Details DB</b>	Inventory Adjustment Voucher	5 Years ^	1 GB
<b>Adjustment Status DB</b>	Adjustment Status List	N/A	50 MB
<b>Request DB</b>	Stationery Requisition Form	5 Years ^	500 MB
<b>Request Details DB</b>	Stationery Requisition Form	5 Years ^	1 GB
<b>Request Status DB</b>	Request Status List	N/A	50 MB
<b>Disbursement DB</b>	Disbursement List	5 Years ^	500 MB
<b>Disbursement Details DB</b>	Disbursement Details List	5 Years ^	500 MB
<b>Disbursement Status DB</b>	Disbursement Status List	N/A	50 MB
<b>Assign Role DB</b>	Temporary Role Status	N/A	50 MB
<b>Category DB</b>	Category Status	N/A	50 MB
<b>Item Catalogue DB</b>	Item Catalogue List	N/A	100MB (Records of 90 stationery items)
<b>Role DB</b>	Role Status	N/A	50 MB

<sup>^</sup> Under the Income Tax Act and the GST Act, businesses liable to pay Income Tax and GST are required to keep their records for at least five years for accounting periods ending on or after 01 Jan 2007.

#### 2.2.1.4 ENTITY SECURITY REQUIREMENT TABLE

*Entity Security Requirement Table* shows the users' access rights to the various data types.

User	Store Manager	Store Supervisor	Store Clerk	Dep Head	Dep Employee	Dep Representative
<b>Data</b>						
<b>Employee DB</b>						
<b>Department DB</b>			R			
<b>Stock Card DB</b>	R	R	C,U,R			
<b>Stock Info DB</b>	R	R	C,U,R			
<b>Supplier DB</b>	R	R	R			
<b>Supplier Catalogue DB</b>	R	R	R			
<b>Collection Point DB</b>	R	R	R			R
<b>Order DB</b>	R	R	C,U,R			
<b>Order Details DB</b>	R	R	C,U,R			
<b>Order Status DB</b>	R	R	R			
<b>Adjustment Voucher DB</b>	U,R	U,R	C,U,R			
<b>Adjustment Details DB</b>	R	R	C,U,R			
<b>Adjustment Status DB</b>	R	R	R			
<b>Request DB</b>			R	U,R	C,U,R	C,U,R
<b>Request Details DB</b>			R	U,R	C,U,R	C,U,R
<b>Request Status DB</b>	R	R	U,R	U,R	R	U,R
<b>Disbursement DB</b>	R	R	U,R			R
<b>Disbursement Details DB</b>	R	R	U,R			R
<b>Disbursement Status DB</b>	R	R	U,R			R
<b>Assign Role DB</b>				C,U,R		
<b>Category DB</b>	R	R	R		R	R
<b>Item Catalogue DB</b>						
<b>Role DB</b>	R	R	R	R	R	R

C: create, U: update, R: read, D: delete \*

\* Delete permission only granted to IT Administrator for security and data integrity concerns.

^ Create permission only granted to IT Administrator

*Use Case Security Requirement Table* shows the users' access rights to the various system functions.

<b>Biz Transaction(use case)\ UserRole(actor)</b>	<b>Stationery Store Manager</b>	<b>Stationery Store Supervisor</b>	<b>Stationery Store clerk</b>	<b>Department employee</b>	<b>Department head</b>
Login	x	x	X(main)	X(main)	X(main)
View inventory information	x	x	X(main)		
Control inventory information(CRUD)			X(main)		
View the order from department			X(main)		
Update the status of order			X(main)		
View the stock card	x	x	X(main)		
Process the stock card(CRUD)			X(main)		
Place the purchase order for supplier (CRUD)			X(main)		
Consolidate the disbursement list			X(main)		
Control the inventory adjustment voucher(CRUD)			X(main)		
View the status of voucher			X(mian)		
Validate the voucher	X(main)	X(main)			
View the catalogue				X(main)	x
Place the requisition (CRUD)				X(main)	
Process the requisition					X(main)
Assign the representative to employee					X(main)
Control the collection point(CRUD)					X(main)

## 2.2.2 SCREEN PROTOTYPE

### 2.2.2.1 DEPARTMENT SCREENS (EMPLOYEE)

Login

Home

## Login

Username

Password

**Login**

Create Order (Employee)

Home Request ▾ Logout

## Create

Category

Item

Unit of measure: Dozen

Quantity

**Submit**

## View Orders (Employee)

Search products						
Request Date	Item Description	Unit of Measure	Quantity	Status	Edit	Delete
28/1/2020	Clips Double 1	Dozen	17	APPROVED	Not allowed	Not allowed
25/1/2020	Clips Double 1	Dozen	7	APPROVED	Not allowed	Not allowed
28/1/2020	Clips Double 1	Dozen	7	APPROVED	Not allowed	Not allowed
28/1/2020	Clips Double 1	Dozen	7	PENDING	<button>Edit</button>	<button>Delete</button>
27/1/2020	Clips Double 1	Dozen	2	APPROVED	Not allowed	Not allowed

Page 1 of 2

1 2 »

## Edit Orders (Employee)

Home	Request	Logout
------	---------	--------

### Update

**Category**

**Item**

**Unit of measure:** Each

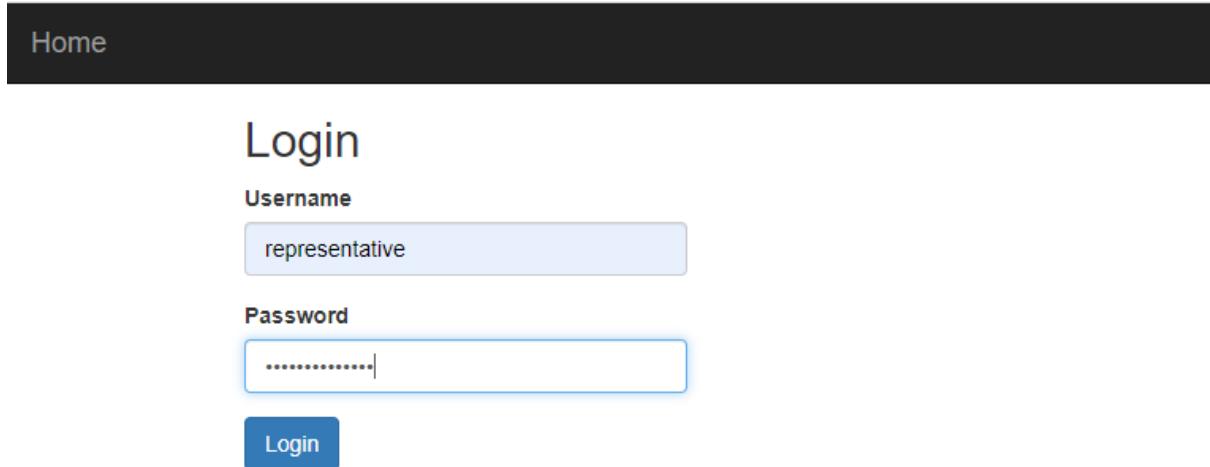
---

**Quantity**

**Submit**

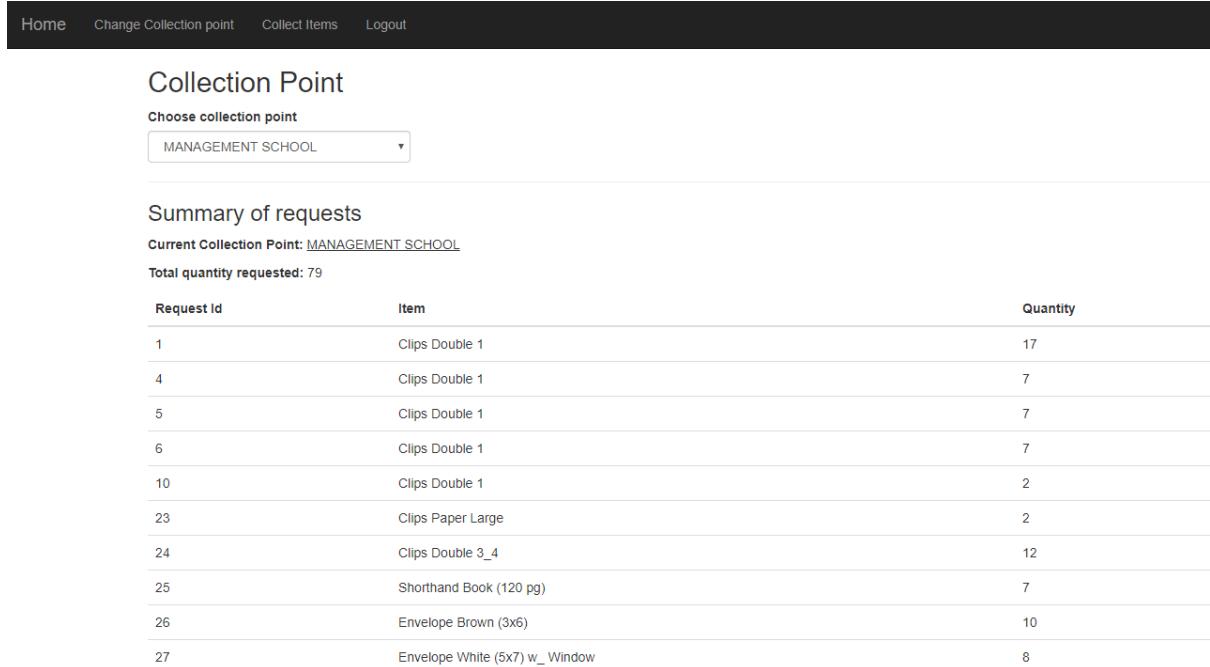
## 2.2.2.2 DEPARTMENT SCREENS (REPRESENTATIVE)

### Login (Department Representative)



The screenshot shows a login interface. At the top, a dark header bar contains the word "Home". Below it, the word "Login" is centered in a large, bold, dark font. Underneath "Login", there are two input fields: one for "Username" containing "representative" and another for "Password" containing a series of asterisks. A blue "Login" button is positioned below the password field.

### Change Collection Point (Department Representative)



The screenshot shows a collection point management screen. At the top, a dark header bar includes links for "Home", "Change Collection point", "Collect Items", and "Logout". Below the header, the title "Collection Point" is displayed. A dropdown menu labeled "Choose collection point" shows "MANAGEMENT SCHOOL" as the selected option. The next section, "Summary of requests", displays the current collection point as "MANAGEMENT SCHOOL" and the total quantity requested as "7". A table then lists the details of 27 requests:

Request Id	Item	Quantity
1	Clips Double 1	17
4	Clips Double 1	7
5	Clips Double 1	7
6	Clips Double 1	7
10	Clips Double 1	2
23	Clips Paper Large	2
24	Clips Double 3_4	12
25	Shorthand Book (120 pg)	7
26	Envelope Brown (3x6)	10
27	Envelope White (5x7) w_ Window	8

## Collect Items (Department Representative)

[Home](#)   [Change Collection point](#)   [Collect Items](#)   [Logout](#)

### Collect Requested Items

Request Id	Item Description	Unit of Measure	Quantity Disbursed	Collection Point	Disbursement Status	Toggle Accepted
4	Clips Double 1	Dozen	7	STATIONERY STORE - ADMINISTRATION BUILDING	READY_FOR_COLLECTION	<button>Accept Delivery</button>
5	Clips Double 1	Dozen	7	STATIONERY STORE - ADMINISTRATION BUILDING	READY_FOR_COLLECTION	<button>Accept Delivery</button>
10	Clips Double 1	Dozen	7	STATIONERY STORE - ADMINISTRATION BUILDING	READY_FOR_COLLECTION	<button>Accept Delivery</button>

### 2.2.2.3 DEPARTMENT SCREENS (HEAD)

#### Login (Department Head)

Home

# Login

**Username**

**Password**

**Login**

#### Approve Order Request (Department Head)

Home    Approve Request    Approval History    Delegate authority    Logout

### ApproveRequest

Request Id	Item Description	Unit of Measure	Quantity	Status	Toggle status	Submit
6	Clips Double 1	Dozen	7	PENDING	PENDING	<input type="button" value="Submit"/>
26	Envelope Brown (3x6)	Each	10	PENDING	PENDING	<input type="button" value="Submit"/>
27	Envelope White (5x7) w_ Window	Each	8	PENDING	PENDING	<input type="button" value="Submit"/>

Page 1 of 1

1

#### View Approval History (Department Head)

Home    Approve Request    Approval History    Delegate authority    Logout

### Approval History

Request Id	Item Description	Quantity	Status
1	Clips Double 1	17	APPROVED
4	Clips Double 1	7	APPROVED
5	Clips Double 1	7	APPROVED
10	Clips Double 1	2	APPROVED
22	Envelope Brown (3x6)	4	DELIVERED
23	Clips Paper Large	2	APPROVED
24	Clips Double 3_4	12	REJECTED
25	Shorthand Book (120 pg)	7	APPROVED
27	Envelope White (5x7) w_ Window	8	REJECTED

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1 2 »

## Delegate Authority (Create) (Department Head)

Home    Approve Request    Approval History    Delegate authority    Logout

### Employee overview

Employee Name	Role Description	Current Assigned Role	Delegate authority	Delegation start date	Delegation end date
Pamela Kow	DEPARTMENT_REP	None	<button>Manage Delegation</button>		
Steven Tan	EMPLOYEE	None	<button>Manage Delegation</button>		
James Lye	DEPARTMENT_REP	None	<button>Manage Delegation</button>		
Keith Teo	STORE_CLERK	None	<button>Manage Delegation</button>		

Home    Approve Request    Approval History    Delegate authority    Logout

## Delegate Authority

Employee : Steven Tan

Role to Assign

DEPARTMENT\_HEAD\_TEMP ▾

Start Date  End Date  x ▾ ▾

Update

## Delegate Authority (Edit/ Delete) (Department Head)

Home    Approve Request    Approval History    Delegate authority    Logout

### Employee overview

Employee Name	Role Description	Current Assigned Role	Delegate authority	Delegation start date	Delegation end date
Pamela Kow	DEPARTMENT_REP	None	<button>Manage Delegation</button>		
Steven Tan	EMPLOYEE	DEPARTMENT_HEAD_TEMP	<button>Manage Delegation</button>	16/2/2020	17/2/2020
James Lye	DEPARTMENT_REP	None	<button>Manage Delegation</button>		
Keith Teo	STORE_CLERK	None	<button>Manage Delegation</button>		

Home    Approve Request    Approval History    Delegate authority    Logout

### Delegate Authority

Employee : Steven Tan

Role to Assign

Start Date  End Date

Remove Delegated Authority

## 2.2.2.4 DEPARTMENT SCREENS (CLERK)

### Login

Logout

### Login

Username

Password

**Login**

### Retrieve from Store

Home   Retrieve from Store   Disbursement   Inventory   Order   Supplier Delivery   Adjustment Voucher ▾   Logout

#### Summary of items to collect

Item	Quantity Requested	Item Location
Envelope Brown (5"x7") w/ Window	32	A10
Envelope Brown (3"x6") w/ Window	26	A10
Exercise Book (100 pg)	78	A11
Clips Double 1"	23	A1

#### Disbursement Information

Disbursement Id	Item	Quantity Disbursed	Status	Submit
2	Envelope Brown (5"x7") w/ Window	7	PENDING	Submit
3	Envelope Brown (3"x6") w/ Window	5	PENDING	Submit
7	Exercise Book (100 pg)	10	PENDING	Submit
9	Clips Double 1"	16	PENDING	Submit
10	Envelope Brown (5"x7") w/ Window	7	PENDING	Submit
11	Envelope Brown (3"x6") w/ Window	5	PENDING	Submit
15	Exercise Book (100 pg)	10	PENDING	Submit

## Disbursement

Home   Retrieve from Store   Disbursement   Inventory   Order   Supplier Delivery   Adjustment Voucher ▾   Logout

### Disbursement

Disbursement Detail Id	Request Id	Department	Description	Unit of measurement	Quantity Requested	Actual Issuing Quantity	Collection Point	Status	Set Status	Edit Allocation
1	1	English Dept	Clips Double 1"	Dozen	17	16	MANAGEMENT SCHOOL	READY_FOR_COLLECTION	Delivered	Edit
2	2	Computer Science	Envelope Brown (5"x7") w/ Window	Each	20	7	STATIONERY STORE - ADMINISTRATION BUILDING	READY_FOR_COLLECTION	Delivered	Edit
3	3	English Dept	Envelope Brown (3"x6") w/ Window	Each	7	5	STATIONERY STORE - ADMINISTRATION BUILDING	READY_FOR_COLLECTION	Delivered	Edit
4	4	English Dept	Envelope Brown (3"x6")	Each	7	7	MANAGEMENT SCHOOL	READY_FOR_COLLECTION	Delivered	Edit
5	5	English Dept	Clips Double 1"	Dozen	7	7	MEDICAL SCHOOL	READY_FOR_COLLECTION	Delivered	Edit

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1 2 »

## Edit Allocation

Home   Retrieve from Store   Disbursement   Inventory   Order   Supplier Delivery   Adjustment Voucher ▾   Logout

### Edit

Transferring Department  
English Dept

Receiving Department

Disbursement Detail Id	Catalogue Code	Description	Unit	Quantity Requested	Actual Issuing Quantity	Quantity To Transfer
12	7	Envelope Brown (3"x6")	Each	2	7	

Transfer

## Inventory List

Inventory List											
Search products		Search Products		Show Insufficient Stock		Select stock level					
Item No	Description	Location	Quantity	Restock Level	Restock Quantity	Unit of Measure	Status	Supplier 1	Supplier 2	Supplier 3	Adjustment
1	Clips Double 1"	A1	75	50	30	Dozen	Sufficient	ALPHA Office Supplies	Cheap Stationer	BANES Shop	<button>Adjust</button>
2	Clips Double 2"	A1	75	50	30	Dozen	Sufficient	ALPHA Office Supplies	BANES Shop	OMEGA Stationery Supplier	<button>Adjust</button>
3	Clips Double 3/4"	A1	70	50	30	Dozen	Sufficient	ALPHA Office Supplies	OMEGA Stationery Supplier	Cheap Stationer	<button>Adjust</button>
4	Clips Paper Large	A1	65	50	30	Box	Sufficient	Cheap Stationer	ALPHA Office Supplies	OMEGA Stationery Supplier	<button>Adjust</button>
5	Clips Paper Medium	A1	60	50	30	Box	Sufficient	OMEGA Stationery Supplier	ALPHA Office Supplies	Cheap Stationer	<button>Adjust</button>
6	Clips Paper Small	A1	40	50	30	Box	Ordered	ALPHA Office Supplies	Cheap Stationer	OMEGA Stationery Supplier	<button>Adjust</button>
7	Envelope Brown (3"x6")	A10	800	600	400	Each	Sufficient	ALPHA Office Supplies	BANES Shop	OMEGA Stationery Supplier	<button>Adjust</button>
8	Envelope Brown (3"x6") w/ Window	A10	870	600	400	Each	Sufficient	BANES Shop	ALPHA Office Supplies	Cheap Stationer	<button>Adjust</button>

## Show Adjustment Entry

ShowAdjustmentEntry						<button>Cancel</button>	<button>Create New Voucher</button>
Item No	Description	Adjustment	Reason	Date			
1	Clips Double 1"	0	Missing from store	2/13/2020			
Add to voucher	Please select						
	27						
		<button>Save adjustment</button>					

## Ordering from supplier

### a. Filtering out inventory with low stock level

Home   Retrieve from Store   Disbursement   Inventory   Data Analytics ▾   Order   Supplier Delivery   Adjustment Voucher ▾   Logout

#### Inventory List

Item No	Description	Location	Quantity	Restock Level	Restock Quantity	Unit of Measure	Status	Supplier 1			Supplier 2		Supplier 3		Adjustment
								BANES Shop	ALPHA Office Supplies	Cheap Stationer	ALPHA Office Supplies	Cheap Stationer	ALPHA Office Supplies	OMEGA Stationery Supplier	
8	Envelope Brown (3"x6") w/ Window	A10	500	600	400	Each	Insufficient	BANES Shop	ALPHA Office Supplies	Cheap Stationer				Adjust	
15	Eraser (hard)	A2	35	50	20	Each	Insufficient	BANES Shop	Cheap Stationer	ALPHA Office Supplies				Adjust	
17	Exercise Book (100 pg)	A11	89	100	50	Each	Insufficient	BANES Shop	ALPHA Office Supplies	OMEGA Stationery Supplier				Adjust	

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### b. Creating new order with supplier

Home   Retrieve from Store   Disbursement   Inventory   Data Analytics ▾   Order   Supplier Delivery   Adjustment Voucher ▾   Logout

#### Inventory List

There isn't an existing order with this supplier. Would you like to create a new order?

Create New Order		Cancel		Adjustment										
8	Envelope Brown (3"x6") w/ Window	A10	500	600	400	Each	Insufficient	BANES Shop	ALPHA Office Supplies	Cheap Stationer				Adjust
15	Eraser (hard)	A2	35	50	20	Each	Insufficient	BANES Shop	Cheap Stationer	ALPHA Office Supplies				Adjust
17	Exercise Book (100 pg)	A11	89	100	50	Each	Insufficient	BANES Shop	ALPHA Office Supplies	OMEGA Stationery Supplier				Adjust

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Home   Retrieve from Store   Disbursement   Inventory   Data Analytics ▾   Order   Supplier Delivery   Adjustment Voucher ▾   Logout

#### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392		

[Remove](#) [Edit](#)

[Return](#) [Enquire Supplier](#) [Submit Order](#) [Delete](#)

### c. Adding order for same supplier

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

#### Inventory List

Search products		Search Products		Select Stock Status		show Insufficient stock					
Item No	Description	Location	Quantity	Restock Level	Restock Quantity	Unit of Measure	Status	Supplier 1	Supplier 2	Supplier 3	Adjustment
15	Eraser (hard)	A2	35	50	20	Each	Insufficient	BANES Shop	Cheap Stationer	ALPHA Office Supplies	<button>Adjust</button>
17	Exercise Book (100 pg)	A11	89	100	50	Each	Insufficient	BANES Shop	ALPHA Office Supplies	OMEGA Stationery Supplier	<button>Adjust</button>

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Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

**Existing Order found !**

There is existing order for this supplier. Please select one from the existing orders to add to. Or create a new order.

Item No	Description	Reorder Qty	<button>Create New Order</button>
15	Eraser (hard)	<input type="text" value="20"/>	
Please select existing order		<input type="text" value="1023"/>	<button>Submit</button>

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

#### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date	
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392			<button>Remove</button> <button>Edit</button>
2	Eraser (hard)	20	Each	\$ 10			<button>Remove</button> <button>Edit</button>

Return Enquire Supplier Submit Order Delete

### d. Enquiring supplier about order

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

#### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date	
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392			<button>Remove</button> <button>Edit</button>
2	Eraser (hard)	20	Each	\$ 10			<button>Remove</button> <button>Edit</button>

Return Enquire Supplier Submit Order Delete

## e. Editing order's details

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

### Your Orders

Your Orders					
No	Order No	Supplier	Status	Order Date	Details
1	1012	ALPHA Office Supplies	DELIVERED		<button>Detail</button>
2	1014	Cheap Stationer	ORDERED		<button>Detail</button>
3	1017	OMEGA Stationery Supplier	ENQUIRING		<button>Detail</button>
4	1023	BANES Shop	ORDERED		<button>Detail</button>

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date	
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392			<button>Remove</button> <button>Edit</button>
2	Eraser (hard)	20	Each	\$ 10			<button>Remove</button> <button>Edit</button>

Return Enquire Supplier Submit Order Delete

Return

## f. Submitting order to the supplier

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date	
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392			<button>Remove</button> <button>Edit</button>
2	Eraser (hard)	20	Each	\$ 10			<button>Remove</button> <button>Edit</button>

Return Enquire Supplier Submit Order Delete

## g. Delete order

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date	
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392			<button>Remove</button> <button>Edit</button>
2	Eraser (hard)	20	Each	\$ 10			<button>Remove</button> <button>Edit</button>

Return Enquire Supplier Submit Order Delete

## h. Engaging second or third supplier

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

### Inventory List

Item No	Description	Location	Quantity	Restock Level	Restock Quantity	Unit of Measure	Status	Supplier 1	Supplier 2	Supplier 3	Adjustment
8	Envelope Brown (3"x6") w/ Window	A10	500	600	400	Each	Enquiring	BANES Shop	ALPHA Office Supplies	Cheap Stationer	<button>Adjust</button>
14	Envelope White (5"x7") w/ Window	A10	500	600	400	Each	Enquiring	OMEGA Stationery Supplier	Cheap Stationer	ALPHA Office Supplies	<button>Adjust</button>
15	Eraser (hard)	A2	35	50	20	Each	Enquiring	BANES Shop	Cheap Stationer	ALPHA Office Supplies	<button>Adjust</button>

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## i. Status of Order

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

### Your Orders

Search Supplier/Status					
No	Order No	Supplier	Status	Order Date	Details
1	1012	ALPHA Office Supplies	DELIVERED		<button>Detail</button>
2	1014	Cheap Stationer	ORDERED		<button>Detail</button>
3	1017	OMEGA Stationery Supplier	ENQUIRING		<button>Detail</button>
4	1023	BANES Shop	ORDERED		<button>Detail</button>

## Accepting delivery

### a. See all incoming delivery

Home Retrieve from Store Disbursement Inventory Data Analytics Order Supplier Delivery Adjustment Voucher Logout

### ShowDelivery

Supplier / Item description						
No	Supplier	Description	Quantity	Unit	Expected Delivery Date	Actual Received Qty
1	BANES Shop	Envelope Brown (3"x6") w/ Window	400	Each	2/12/2020 12:00:00 AM	<input type="text" value="400"/> <button>Accept</button>
2	BANES Shop	Eraser (hard)	20	Each	2/12/2020 12:00:00 AM	<input type="text" value="20"/> <button>Accept</button>

## b. Accepting delivery

Home   Retrieve from Store   Disbursement   Inventory   Data Analytics   Order   Supplier Delivery   Adjustment Voucher   Logout

### ShowDelivery

Supplier / Item description

No	Supplier	Description	Quantity	Unit	Expected Delivery Date	Actual Received Qty	
1	BANES Shop	Envelope Brown (3"x6") w/ Window	400	Each	2/12/2020 12:00:00 AM	400	<button>Accept</button>
2	BANES Shop	Eraser (hard)	20	Each	2/12/2020 12:00:00 AM	20	<button>Accept</button>

Home   Retrieve from Store   Disbursement   Inventory   Data Analytics   Order   Supplier Delivery   Adjustment Voucher   Logout

### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392	2/12/2020 12:00:00 AM	
2	Eraser (hard)	20	Each	\$ 10	2/12/2020 12:00:00 AM	2/13/2020 3:06:49 AM

Return

Home   Retrieve from Store   Disbursement   Inventory   Data Analytics   Order   Supplier Delivery   Adjustment Voucher   Logout

### Inventory List

Search products  Select Stock Status

Item No	Description	Location	Quantity	Restock Level	Restock Quantity	Unit of Measure	Status	Supplier 1	Supplier 2	Supplier 3	Adjustment
15	Eraser (hard)	A2	55	50	20	Each	Sufficient	BANES Shop	Cheap Stationer	ALPHA Office Supplies	<button>Adjust</button>
16	Eraser (soft)	A2	63	50	20	Each	Sufficient	BANES Shop	ALPHA Office Supplies	Cheap Stationer	<button>Adjust</button>

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1

Home   Retrieve from Store   Disbursement   Inventory   Data Analytics   Order   Supplier Delivery   Adjustment Voucher   Logout

### ViewPO

No	Description	Quantity	Unit	Amount	Expected Delivery Date	Actual Delivery Date
1	Envelope Brown (3"x6") w/ Window	400	Each	\$ 392	2/12/2020 12:00:00 AM	2/13/2020 3:21:03 AM
2	Eraser (hard)	20	Each	\$ 10	2/12/2020 12:00:00 AM	2/13/2020 3:06:49 AM

Return

Home   Retrieve from Store   Disbursement   Inventory   Data Analytics   Order   Supplier Delivery   Adjustment Voucher   Logout

### Your Orders

Search Supplier/Status

No	Order No	Supplier	Status	Order Date	Details
1	1012	ALPHA Office Supplies	DELIVERED		<button>Detail</button>
2	1014	Cheap Stationer	DELIVERED		<button>Detail</button>
3	1017	OMEGA Stationery Supplier	DELIVERED		<button>Detail</button>
4	1023	BANES Shop	DELIVERED		<button>Detail</button>

## Create Adjustment Vouchers

Home    Retrieve from Store    Disbursement    Inventory    Order    Supplier Delivery    Adjustment Voucher ▾    Logout

### CreateVoucher

Voucher No: 2

Date: 09-Feb-20 12:57:25 PM

Item

Clips Double 1"

Quantity

Reason

Total Amount

AddItem

Home    Retrieve from Store    Disbursement    Inventory    Data Analytics ▾    Order    Supplier Delivery    Adjustment Voucher ▾    Logout

#### View voucher's details

No	Description	Quantity	Unit	Amount	Reason
1	Clips Double 1"	-3	Dozen	\$ 6	Missing from store
2	Clips Paper Medium	-3	Box	\$ 7.5	Missing from store

[Return](#) [Submit](#)

## View Voucher List

Home    Retrieve from Store    Disbursement    Inventory    Data Analytics ▾    Order    Supplier Delivery    Adjustment Voucher ▾    Logout

### View All Vouchers

Filter by Status

No status selected

VoucherNo	RequestDate	TotalCost	Status	Details
25	2/12/2020 12:00:00 AM	\$-33	SUBMITTED	<a href="#">Detail</a>
26	2/13/2020 12:00:00 AM	\$-21.5	SUBMITTED	<a href="#">Detail</a>

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1

### View voucher's details

No	Description	Quantity	Unit	Amount	Reason
1	Clips Double 1"	-3	Dozen	\$ 6	Missing from store
2	Clips Double 2"	-1	Dozen	\$ 3	Missing from store
3	Clips Paper Large	-5	Box	\$ 12.5	Missing from store

[Return](#)

### Data analytics

#### a. Year over Year demand analysis

### Analytic Page

Date  Category

Year over Year Analysis

Short Term Trend

very Adjustment Voucher ▾ Logout

#### Stock Demand Analytic (Year-over-year)

Category :

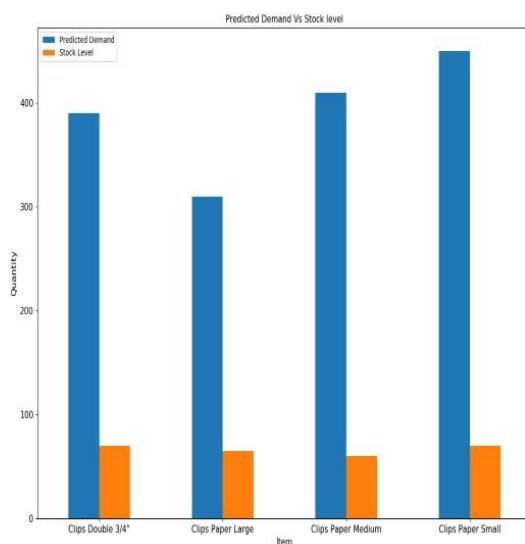
CLIP

Predicting date :

2/12/2020

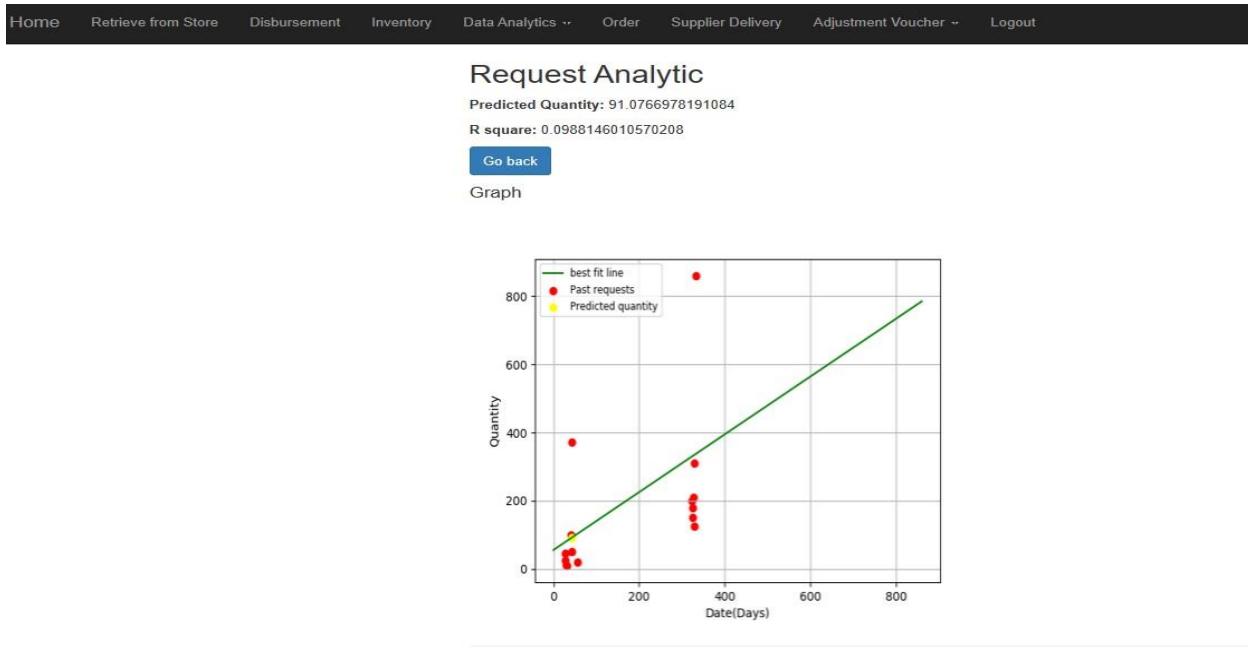
No	Item Id	Description	Predicted demand for next 4 weeks	Current stock level	Recommended reorder qty
1	3	Clips Double 3/4"	360	70	320
2	4	Clips Paper Large	310	65	245
3	5	Clips Paper Medium	410	60	360
4	6	Clips Paper Small	450	70	380

Graph



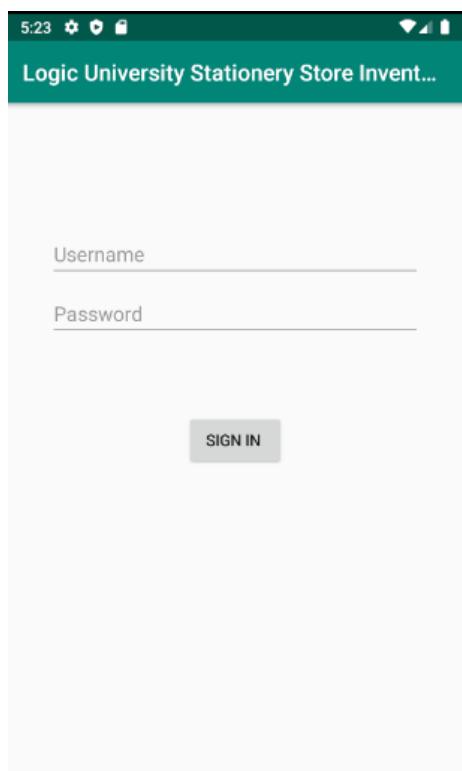
[Go back](#)

## b. Short term trend analysis

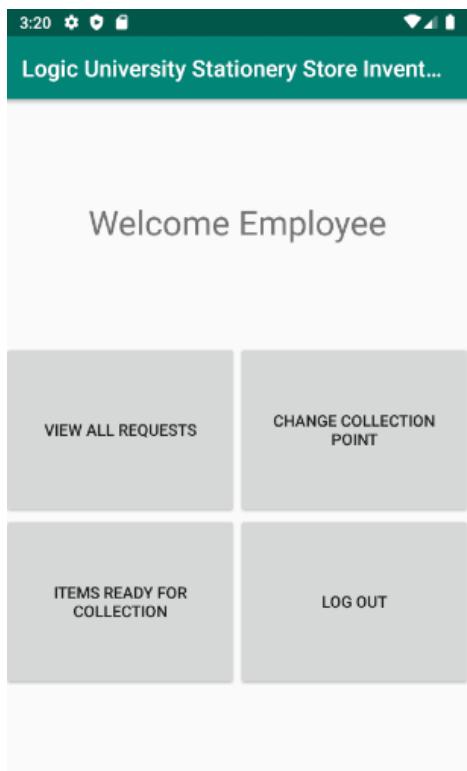


### 2.2.2.5 MOBILE SCREENS (REPRESENTATIVE)

#### Login



### Homepage (Welcome Page)

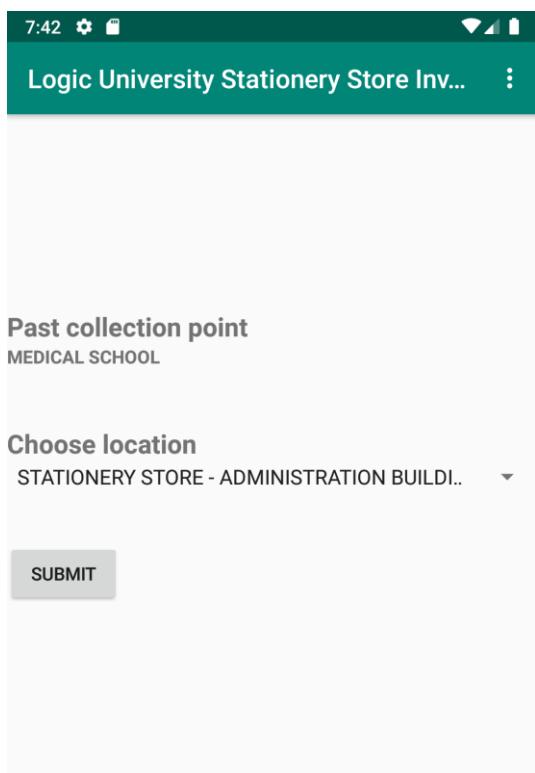


### Items Ready for Collection

The screenshot shows a list of items ready for collection. At the top, a green header bar displays the text "Logic University Stationery Store Inv..." and the time "7:42". Below the header, there is a table with the following data:

Request Date	Item Description	Collection Location	Quantity	Accept Delivery
29-Jan-20	Exercise Book (100)	STATIONERY7 STORE -	7	ACCEPT
03-Feb-20	Envelope White (3"x6")	STATIONERY7 STORE -	1	ACCEPT

### Change Collection Point



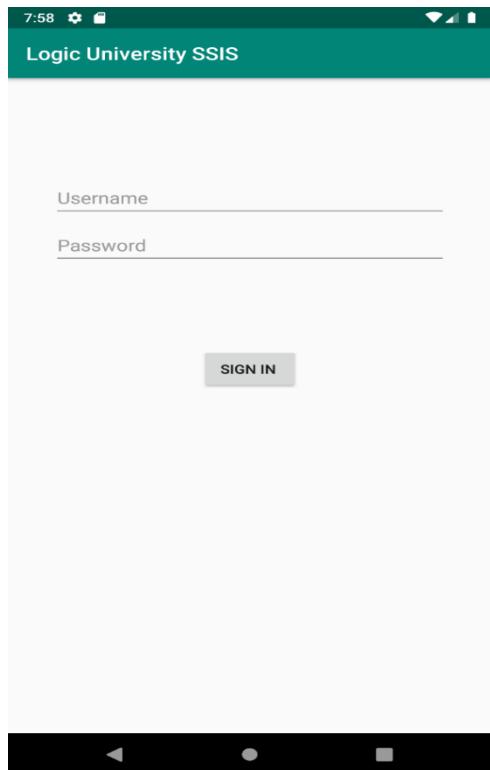
### View All Requests

The screenshot shows a mobile application interface. At the top, there is a green header bar with the text "Logic University Stationery Store Inv..." and three vertical dots on the right. Below the header, the screen displays a table of requests:

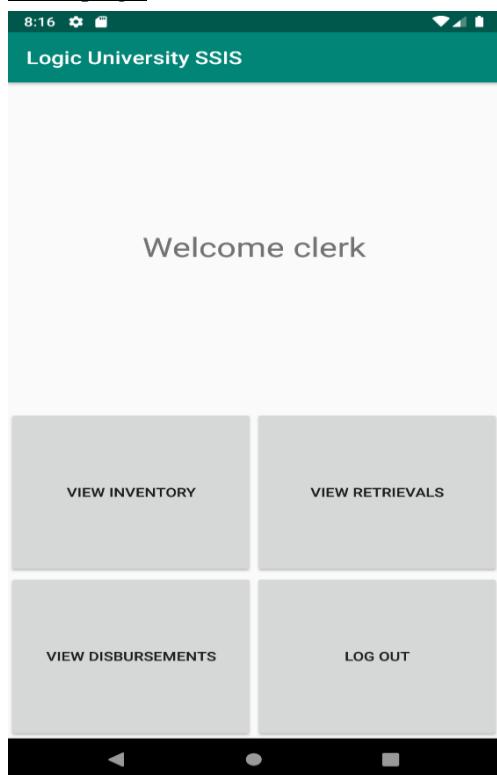
Request Date	Item Description	Request Status	Quantity
28/1/2020	Clips Double 1	PENDING	17
28/1/2020	Clips Double 1	APPROVED	7
28/1/2020	Clips Double 1	PENDING	7
27/1/2020	Clips Double 1	APPROVED	2
8/2/2020	Clips Paper Large	PENDING	2

## **2.2.2.6 MOBILE SCREENS (STORE CLERK)**

### Login



### Homepage



## View inventory list

Description	Location	Quantity	Unit	Adjust
Clips Double 1"	A1	40	Dozen	<b>ADJUST</b>
Clips Double 2"	A1	75	Dozen	<b>ADJUST</b>
Clips Double 3/4"	A1	70	Dozen	<b>ADJUST</b>
Clips Paper Large	A1	65	Box	<b>ADJUST</b>
Clips Paper Medium	A1	60	Box	<b>ADJUST</b>
Clips Paper Small	A1	70	Box	<b>ADJUST</b>
Envelope Brown (3"x6")	A10	710	Each	<b>ADJUST</b>
Envelope Brown (3"x6") w/ Window	A10	900	Each	<b>ADJUST</b>
Envelope Brown (5"x7")	A10	750	Each	<b>ADJUST</b>
Envelope	A10	668	Each	<b>ADJUST</b>

## Adjust Inventory Quantity

Item ID	Description
1	Clips Double 1"

Adj      Reason

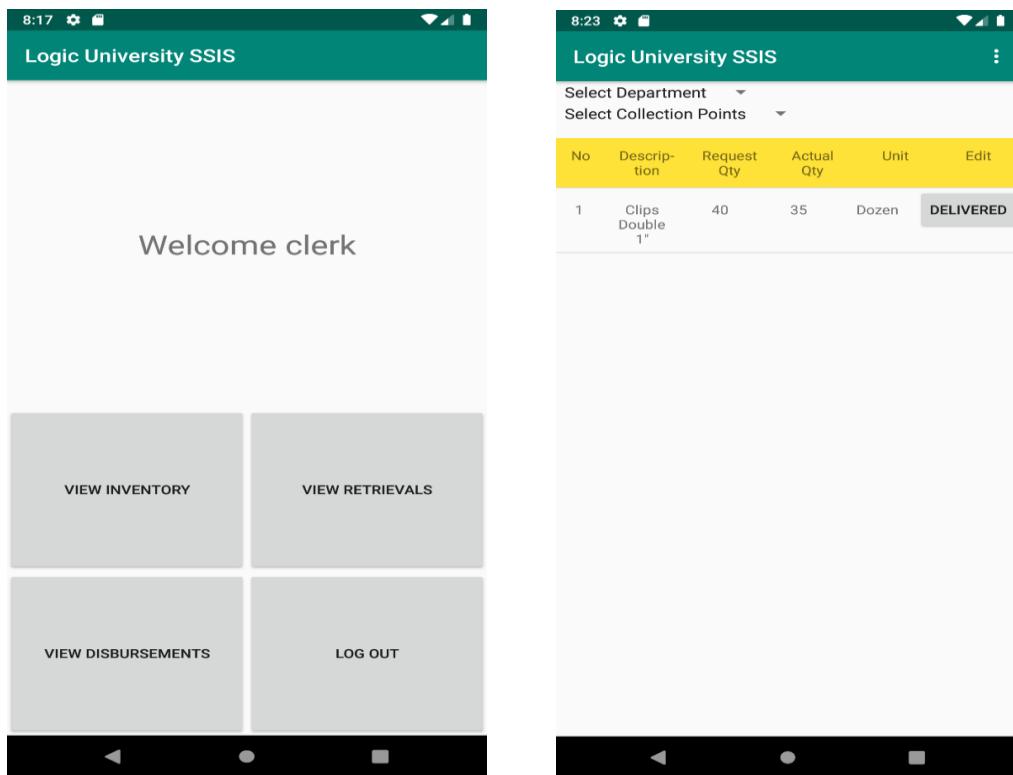
0      Missing from store

Add to voucher    27

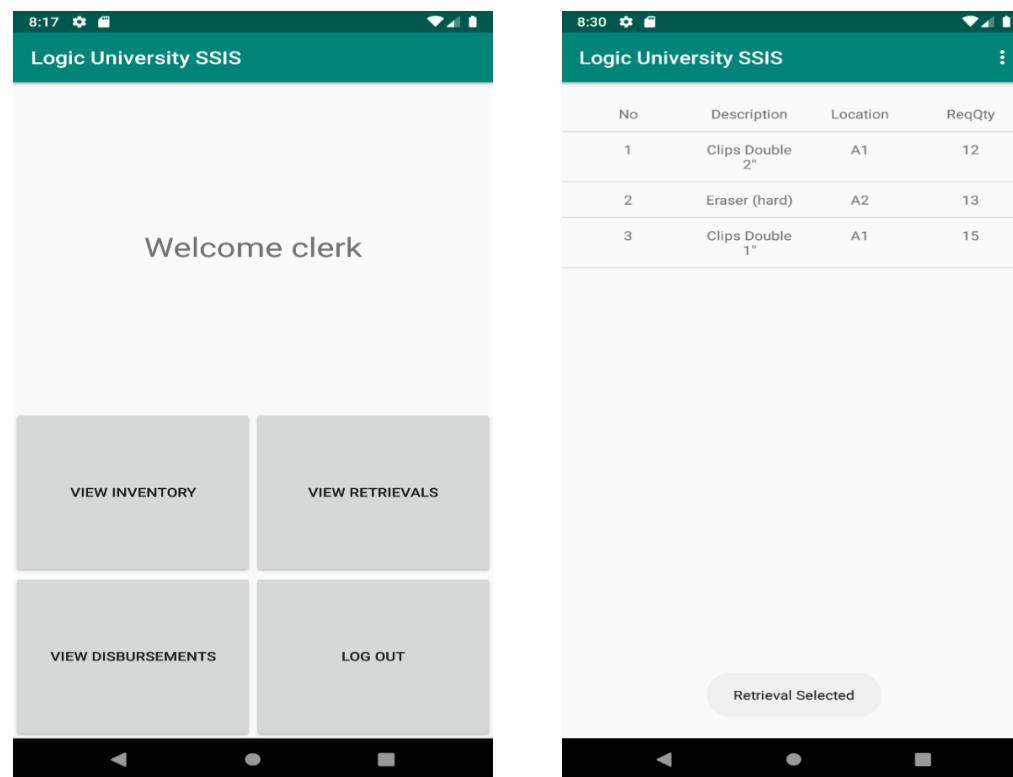
**SAVE ADJUSTMENT**

**CREATE NEW VOUCHER**

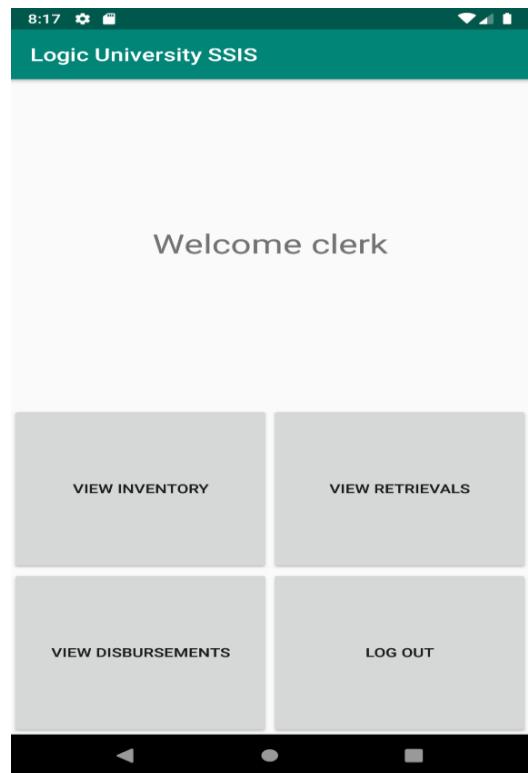
### View Disbursement List



### View Retrieval List



Logout

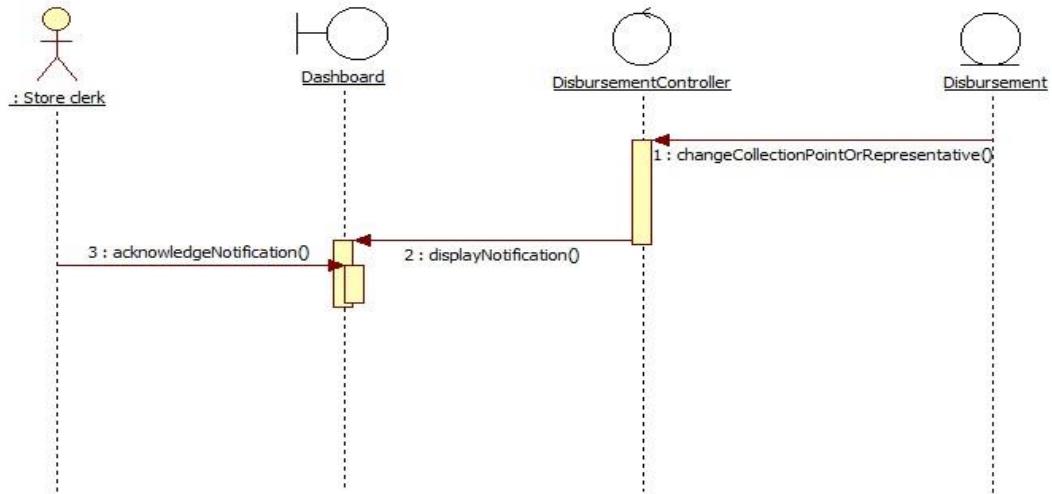


## 2.3 ANALYSIS WORKFLOW

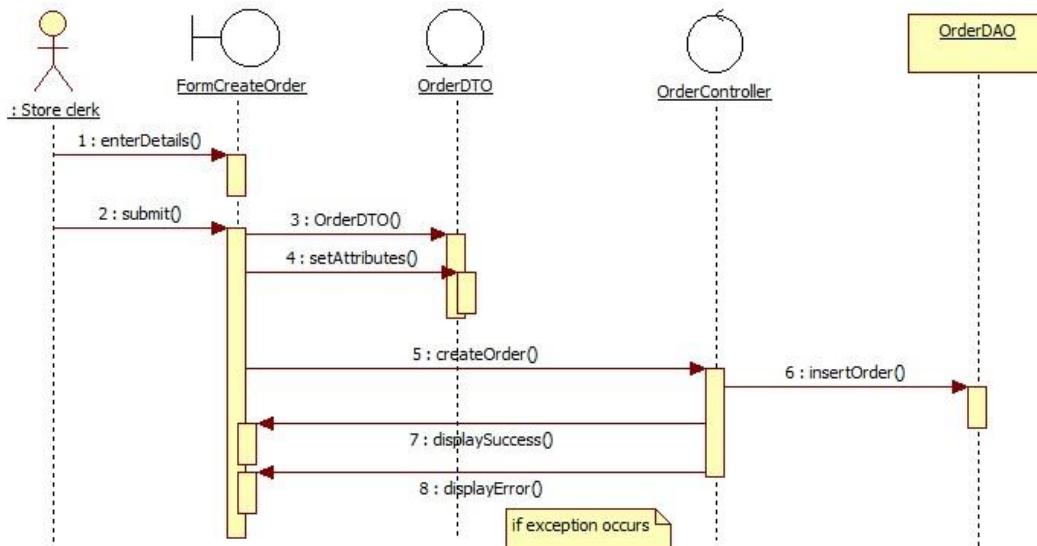
### 2.3.1 SEQUENCE DIAGRAM

#### 2.3.1.1 STORE SEQUENCE DIAGRAMS

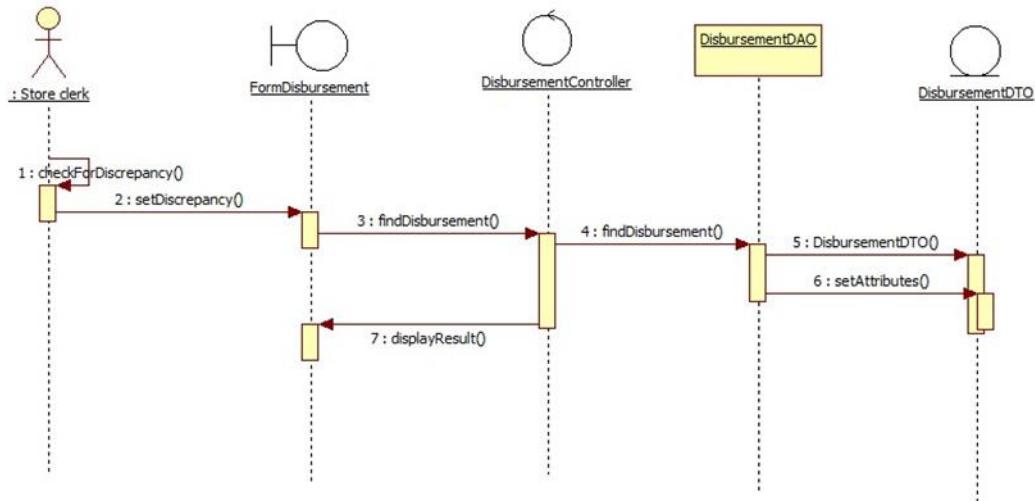
##### 2.3.1.1.1 COLLECTION NOTIFICATION



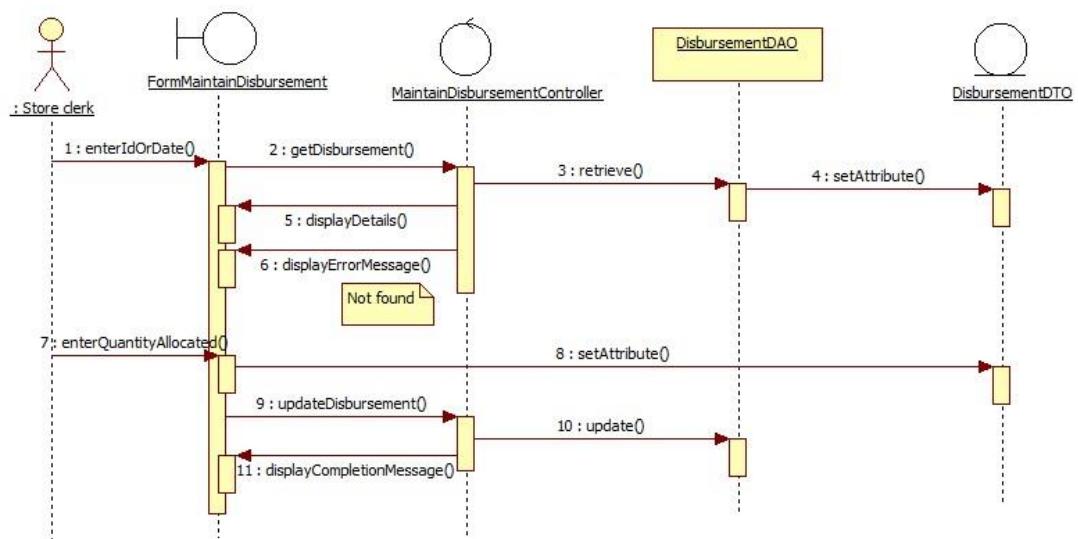
##### 2.3.1.1.2 CREATE ORDERS



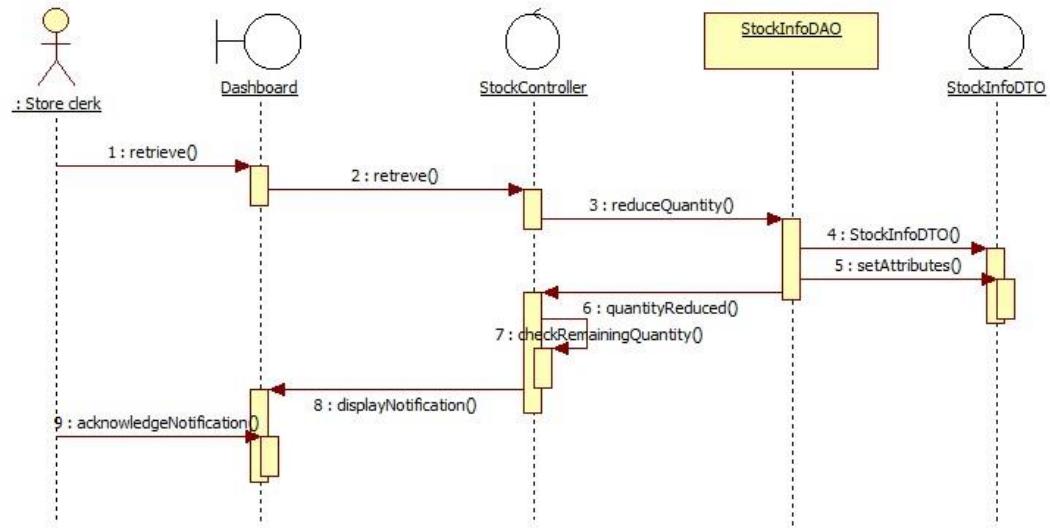
### 2.3.1.3 DISBURSEMENT DISCREPANCY



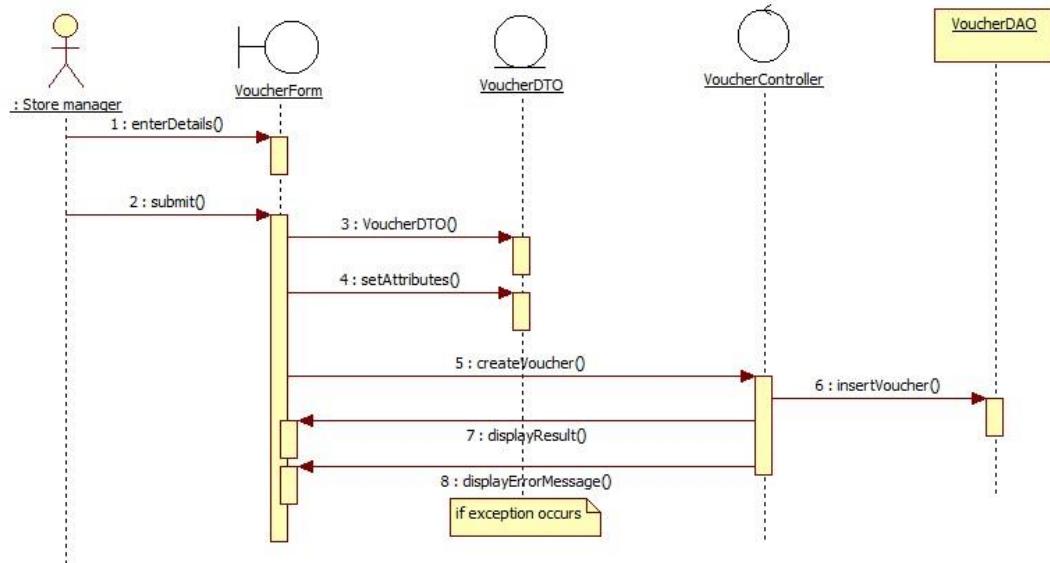
### 2.3.1.4 DISBURSEMENT STATIONERY



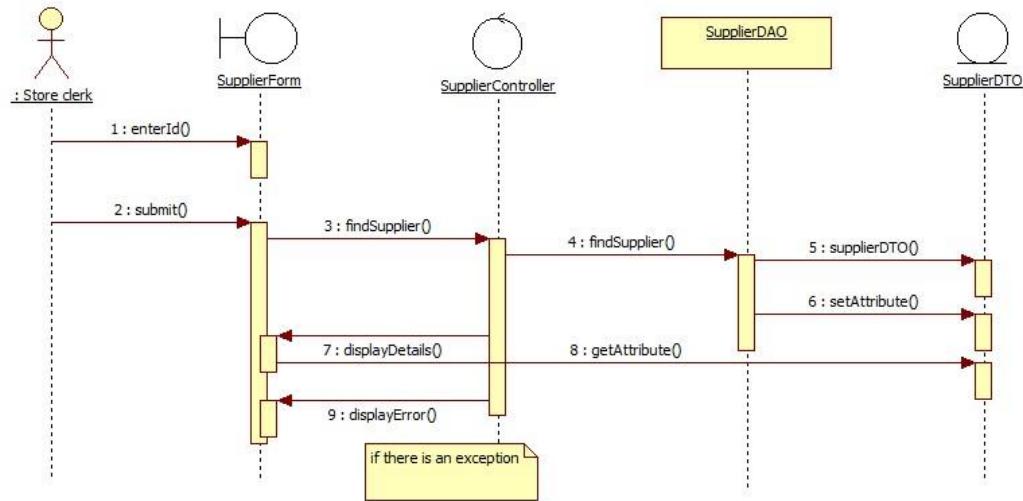
### 2.3.1.5 STOCK NOTIFICATION



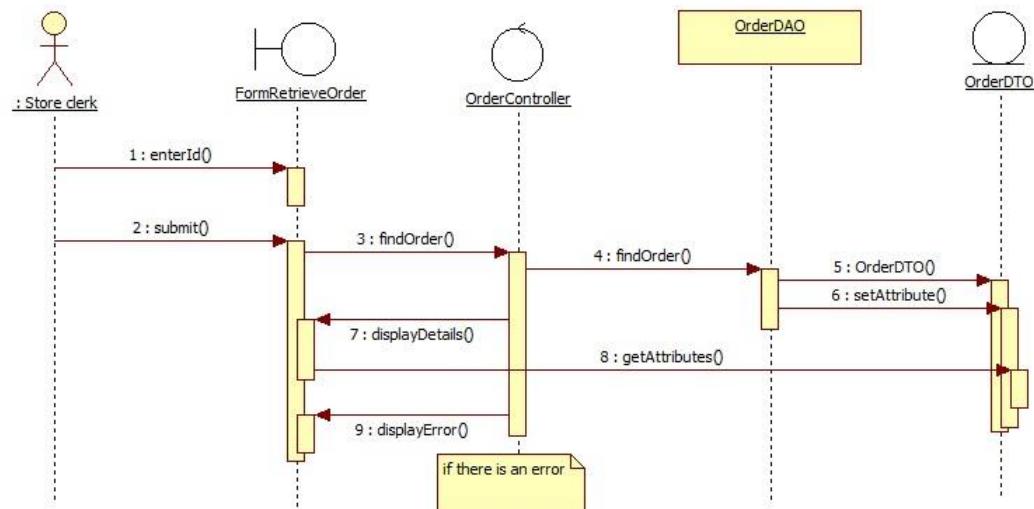
### 2.3.1.6 MANAGE ADJUSTMENT VOUCHER



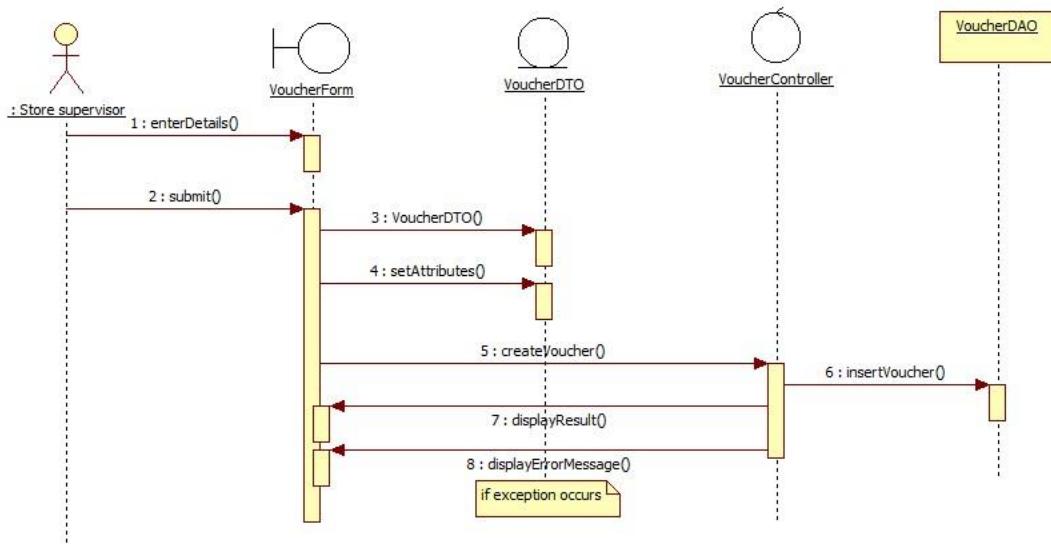
### 2.3.1.1.7 RETRIEVE SUPPLIERS



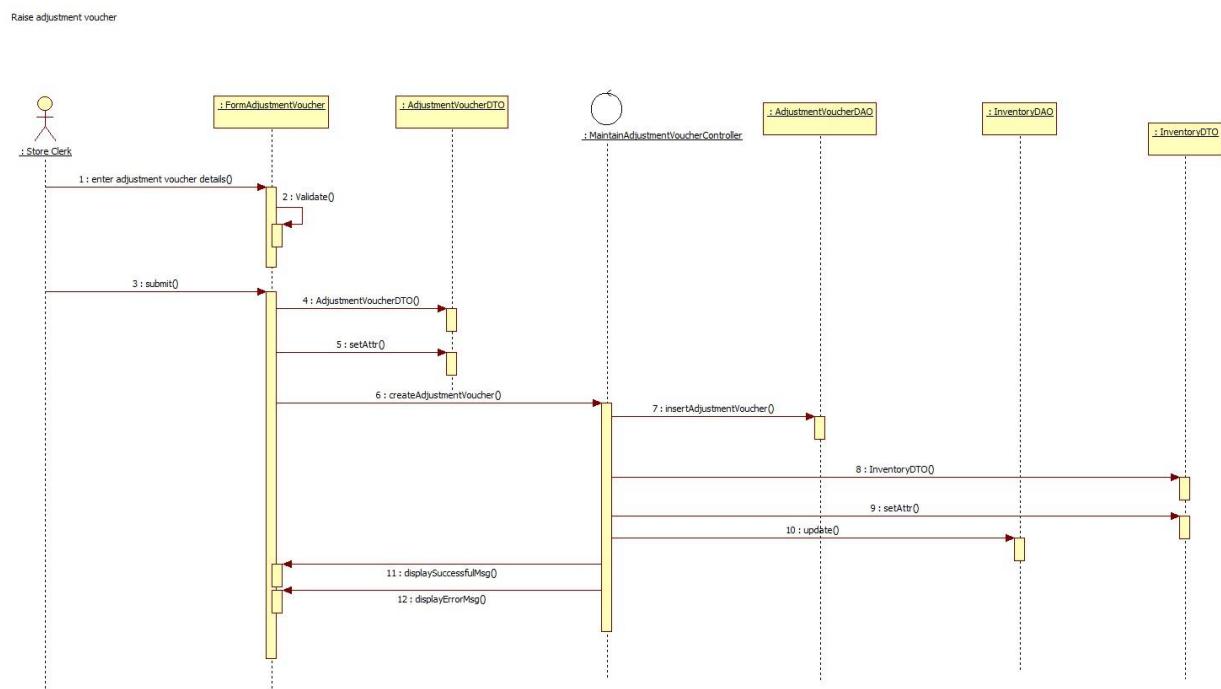
### 2.3.1.1.8 RETRIEVE ORDERS



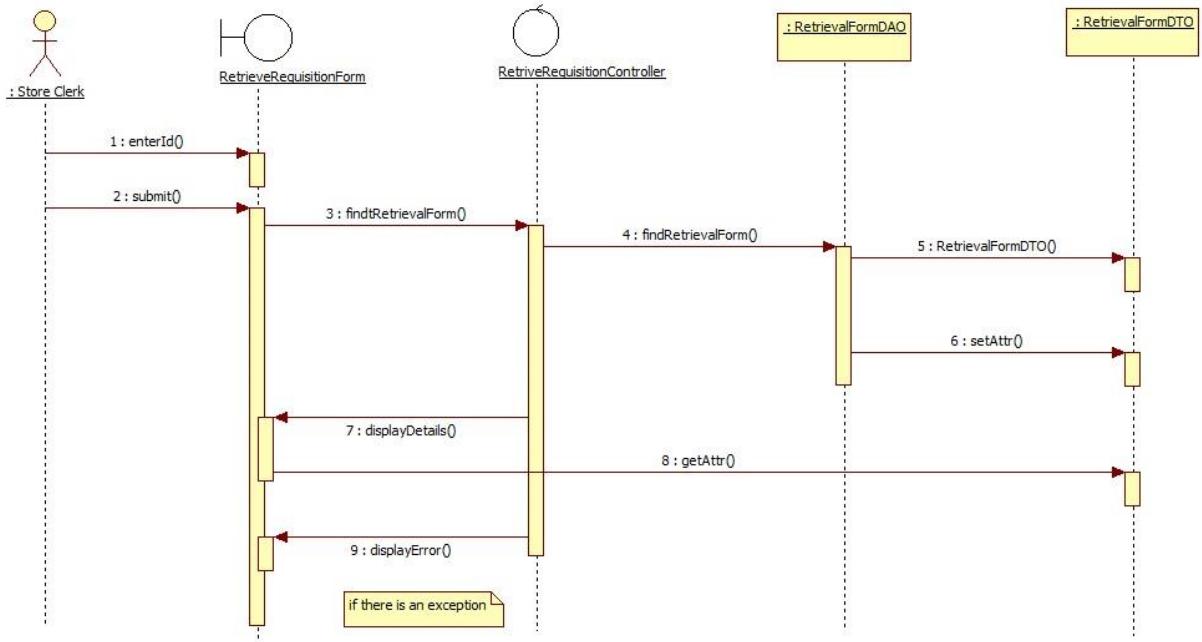
### 2.3.1.1.9 SUPERVISOR ADJUSTMENT VOUCHER SEQUENCE DIAGRAM



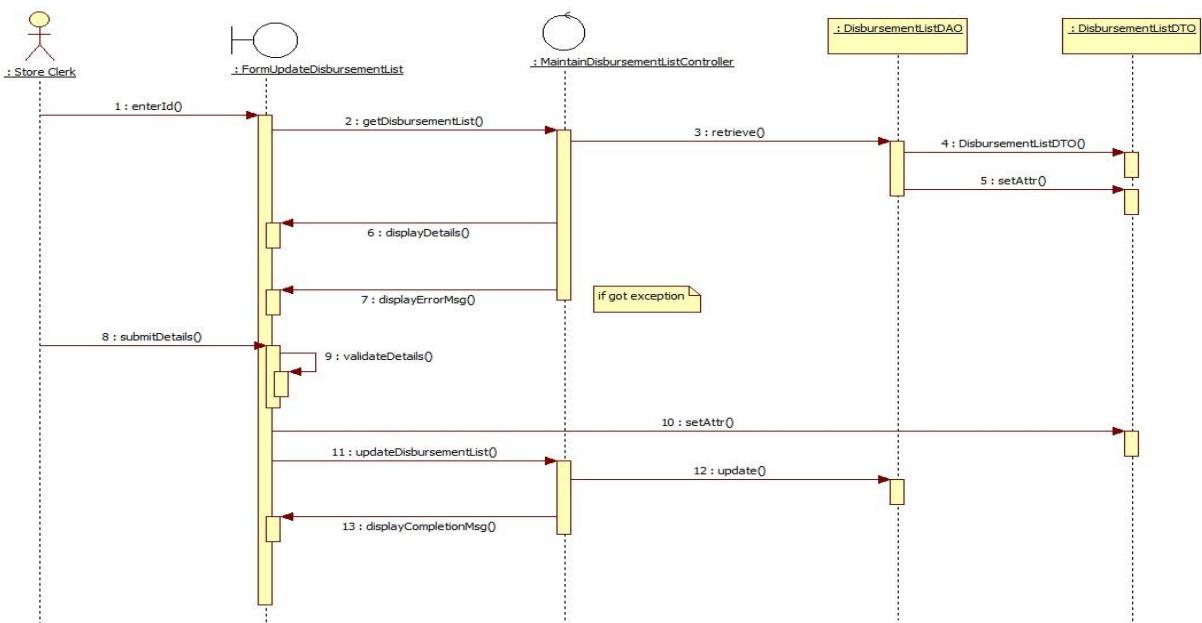
### 2.3.1.1.10 RAISE ADJUSTMENT VOUCHER



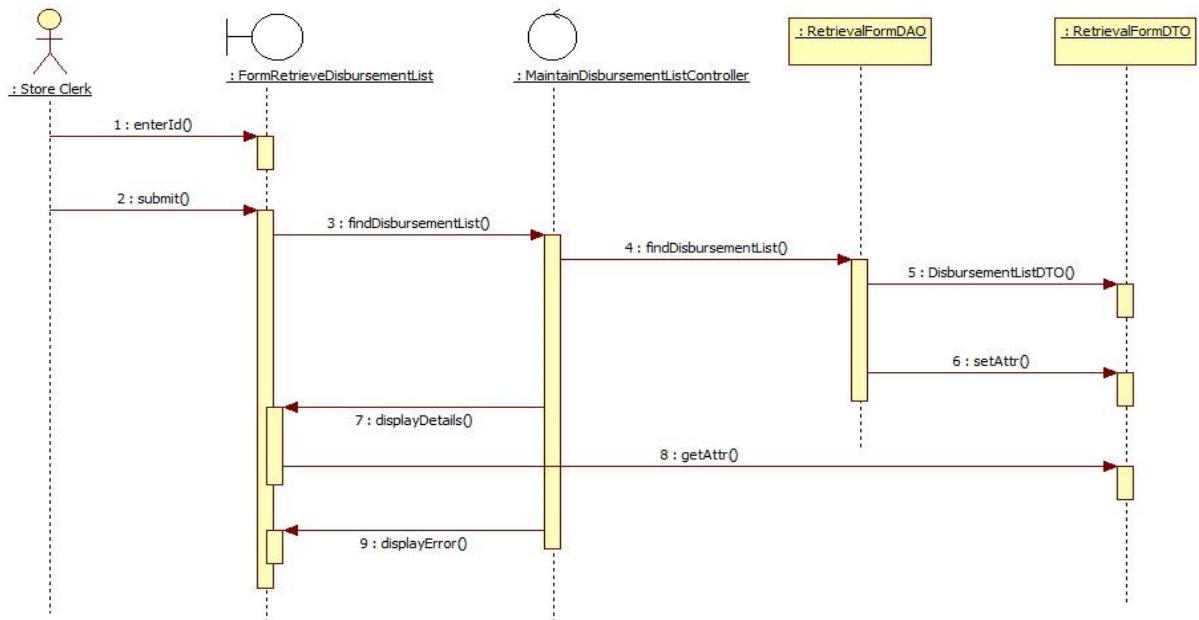
### 2.3.1.11 RETRIEVE REQUISITION FORM



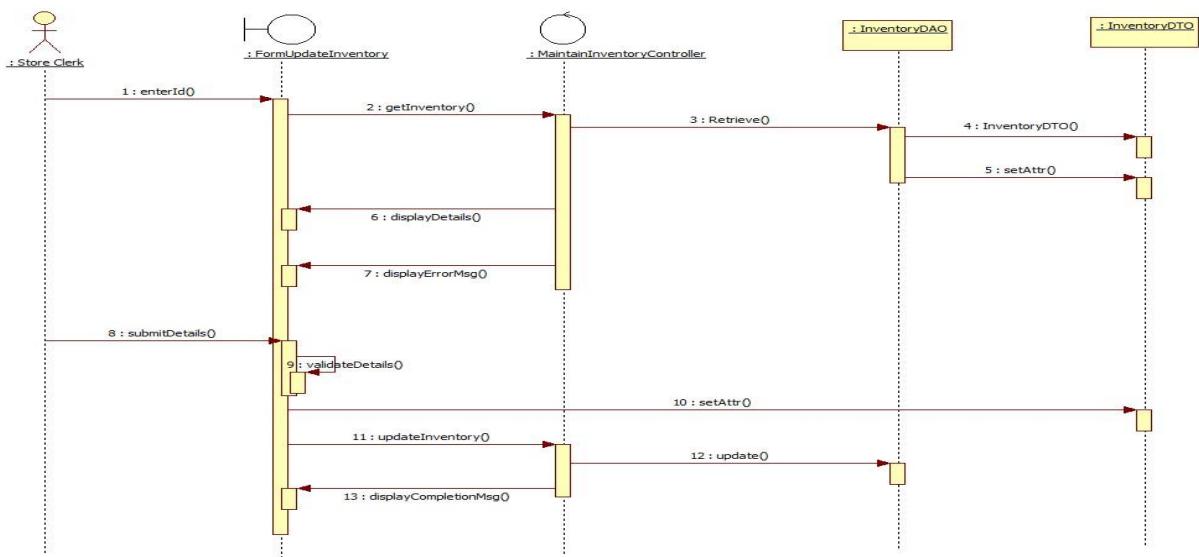
### 2.3.1.12 UPDATE DISBURSEMENT LIST



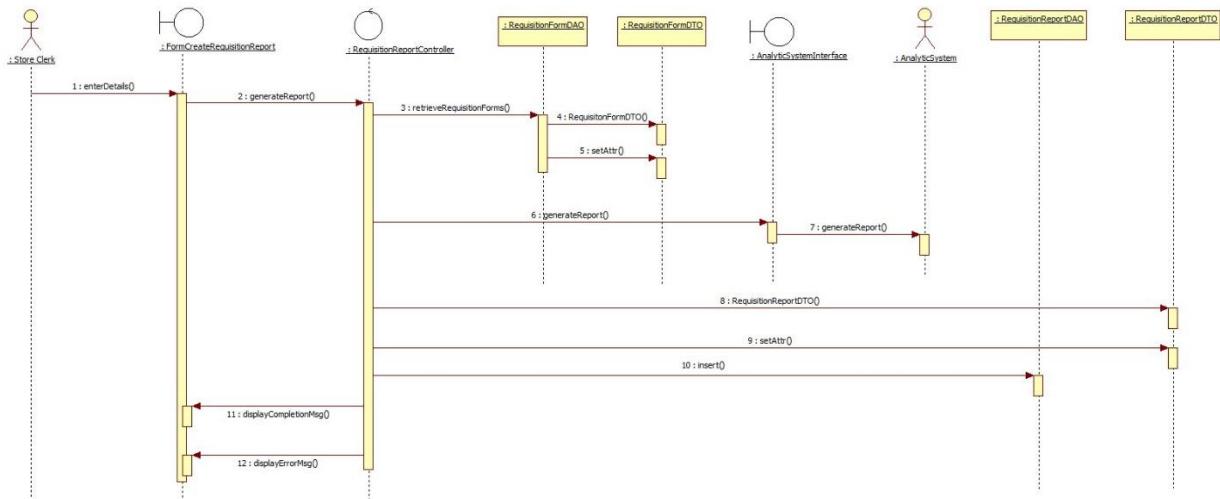
### 2.3.1.13 RETRIEVE DISBURSEMENT LIST



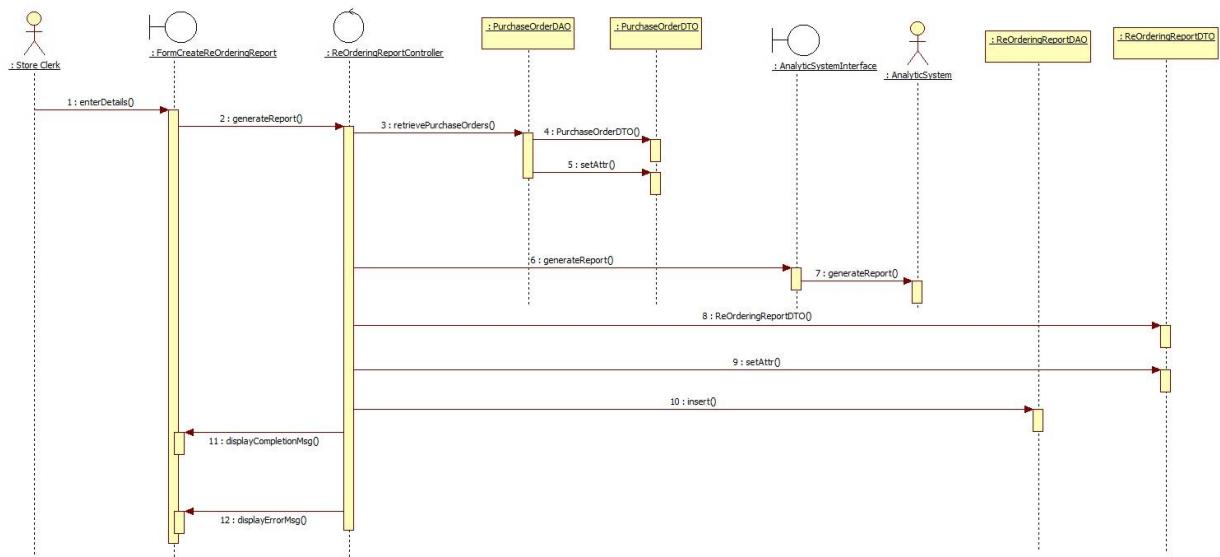
### 2.3.1.14 UPDATE INVENTORY



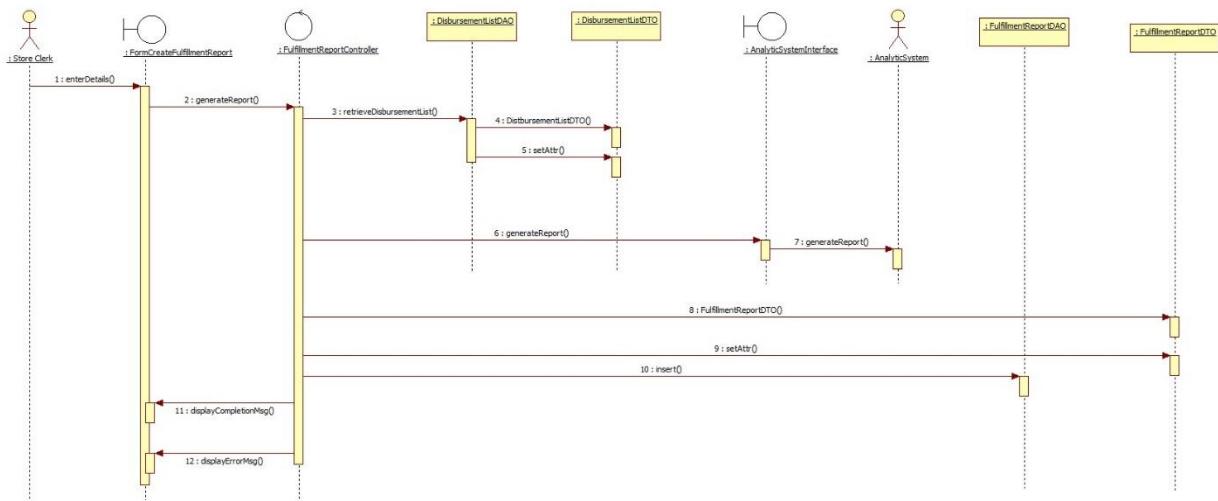
### 2.3.1.15 CREATE REQUISITION REPORT



### 2.3.1.16 CREATE RE-ORDERING REPORT

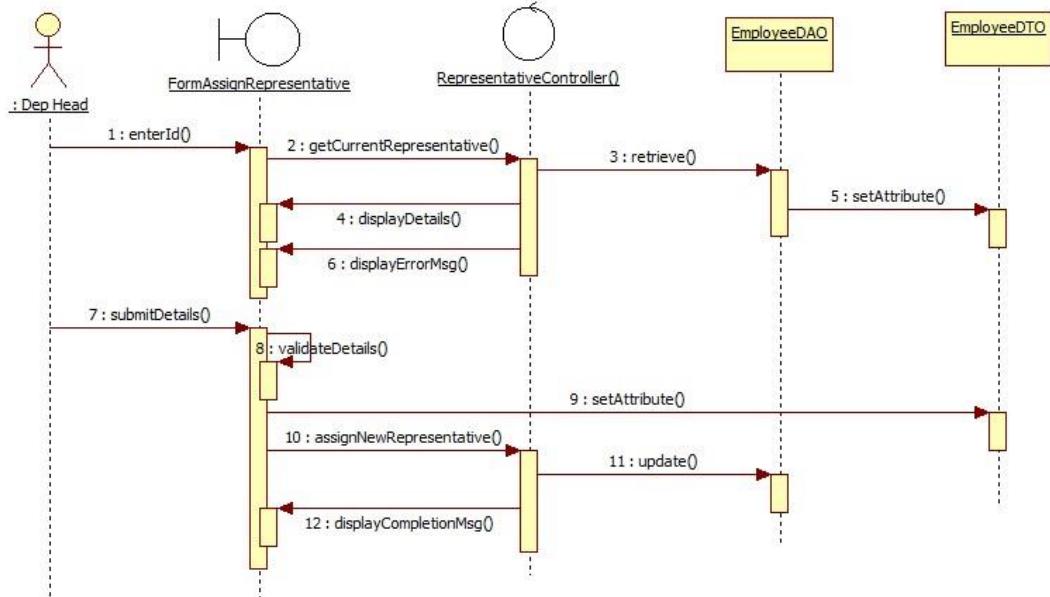


### 2.3.1.17 CREATE FULFILMENT REPORT

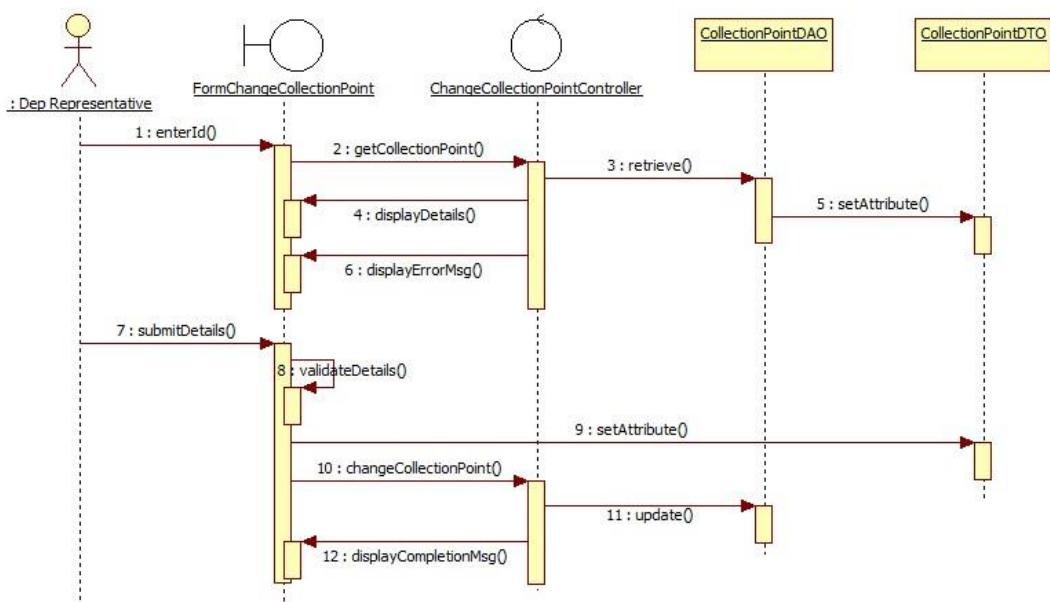


### 2.3.1.2 DEPARTMENT SEQUENCE DIAGRAMS

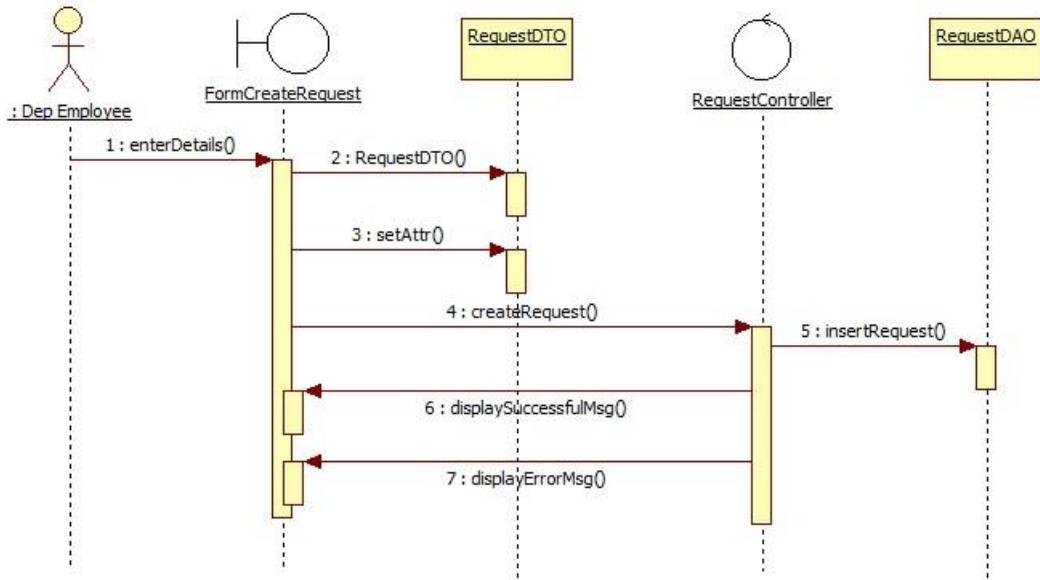
#### 2.3.1.2.1 ASSIGN REPRESENTATIVE SEQUENCE DIAGRAM



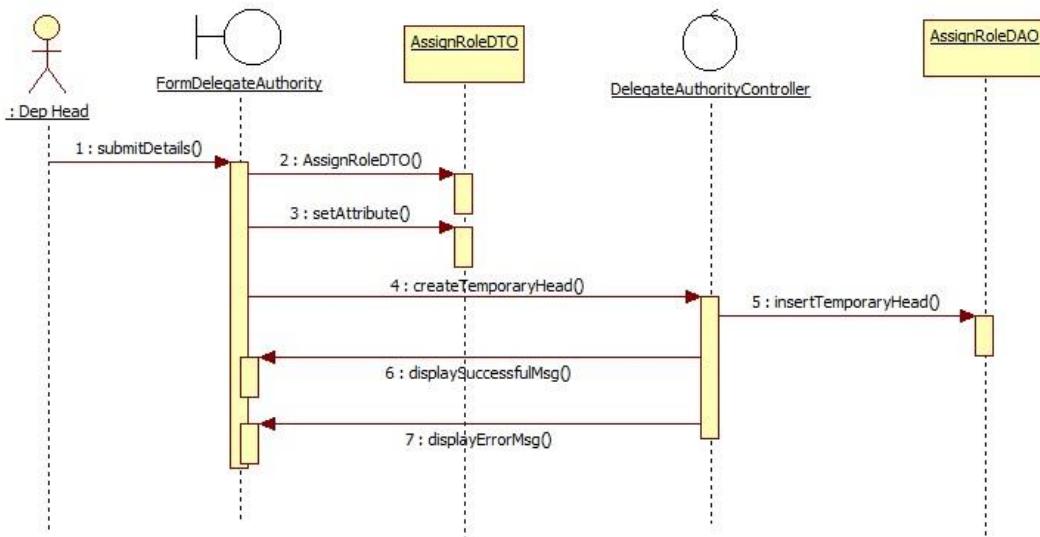
#### 2.3.1.2.2 CHANGE COLLECTION POINT SEQUENCE DIAGRAM



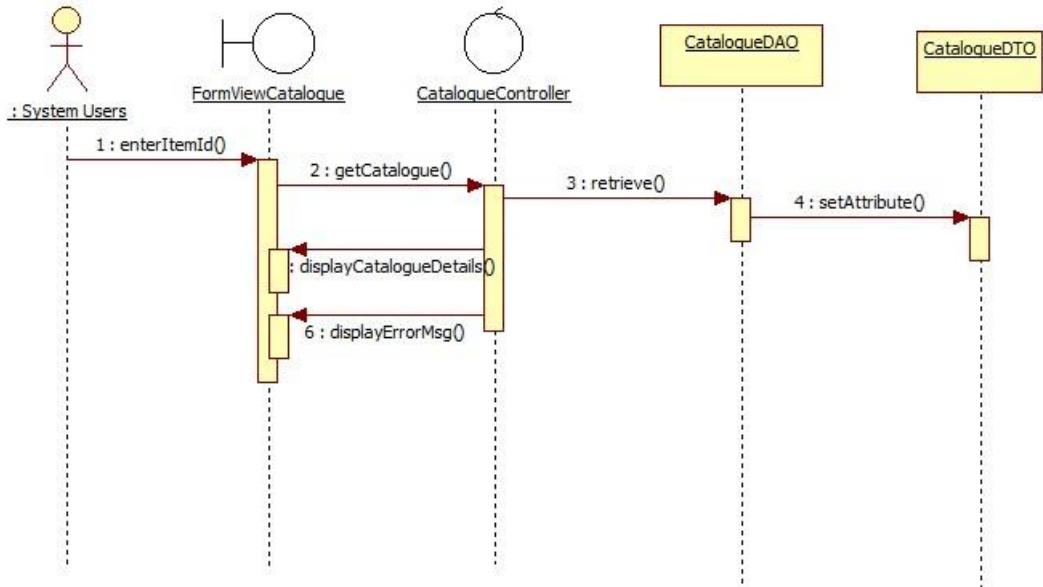
### 2.3.1.2.3 CREATE REQUEST SEQUENCE DIAGRAM



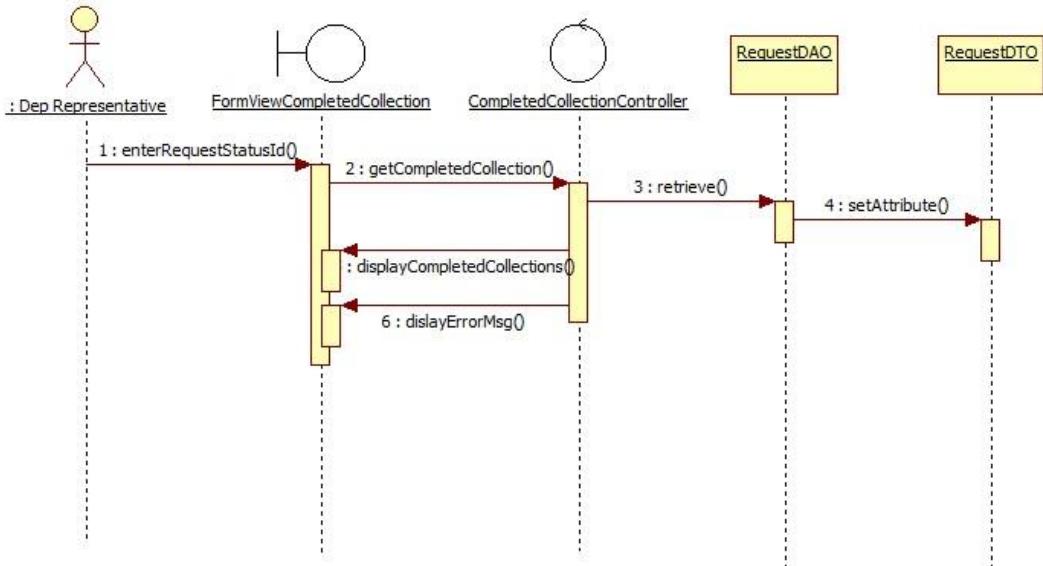
### 2.3.1.2.4 DELEGATE AUTHORITY SEQUENCE DIAGRAM



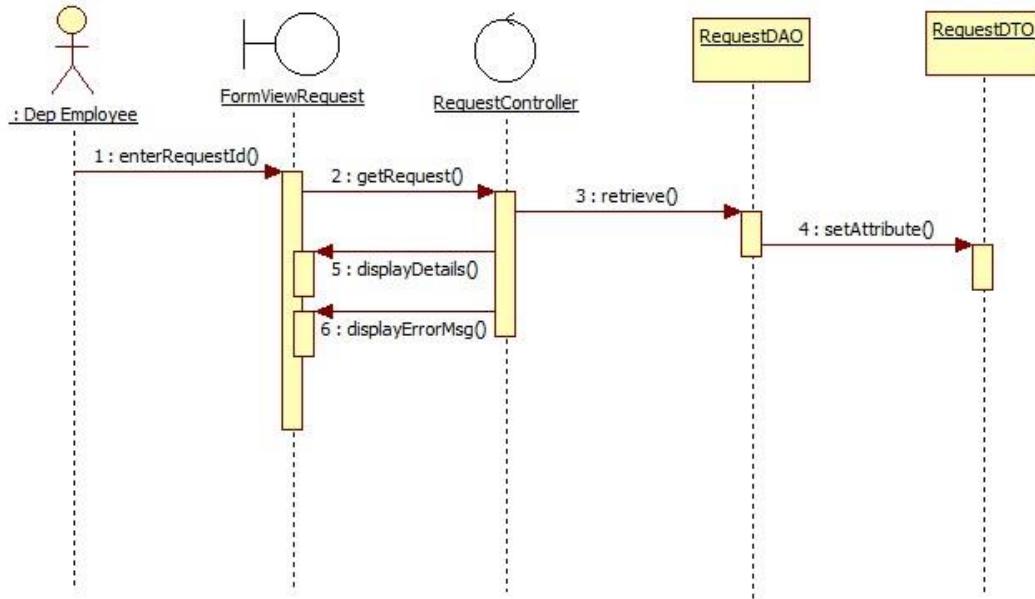
### 2.3.1.2.5 VIEW CATALOGUE SEQUENCE DIAGRAM



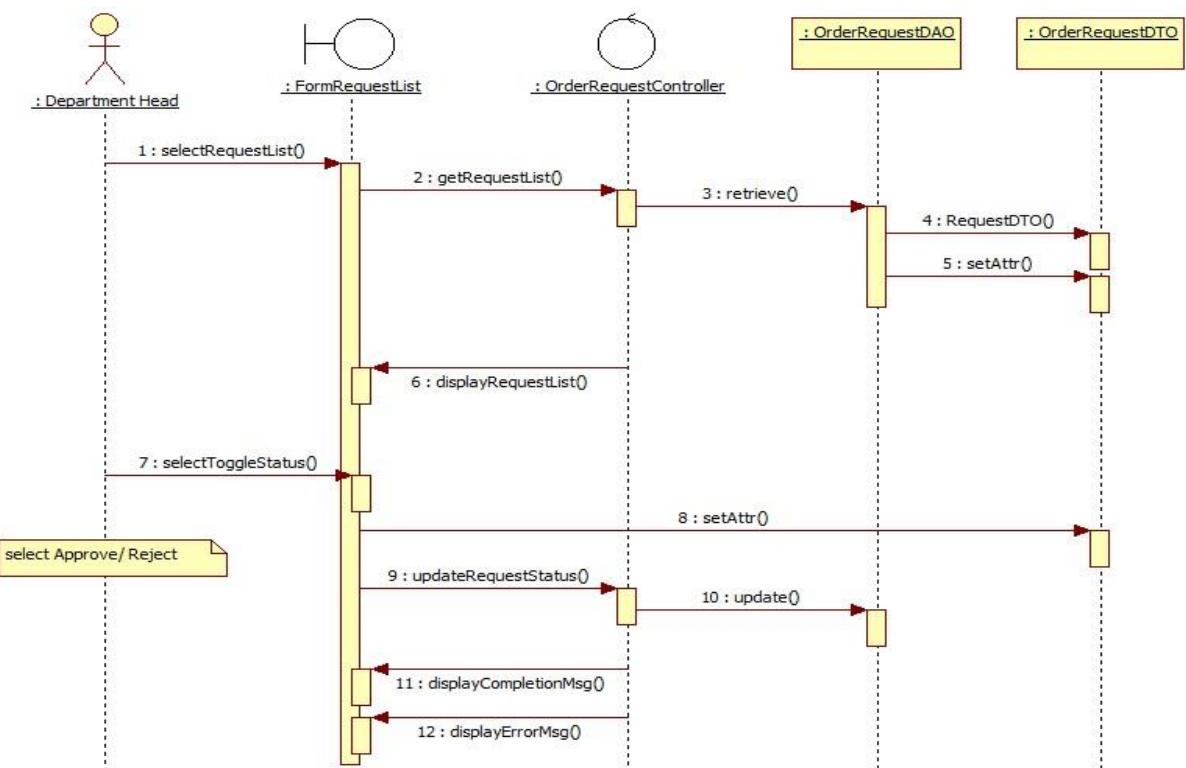
### 2.3.1.2.6 VIEW COMPLETED SEQUENCE DIAGRAM



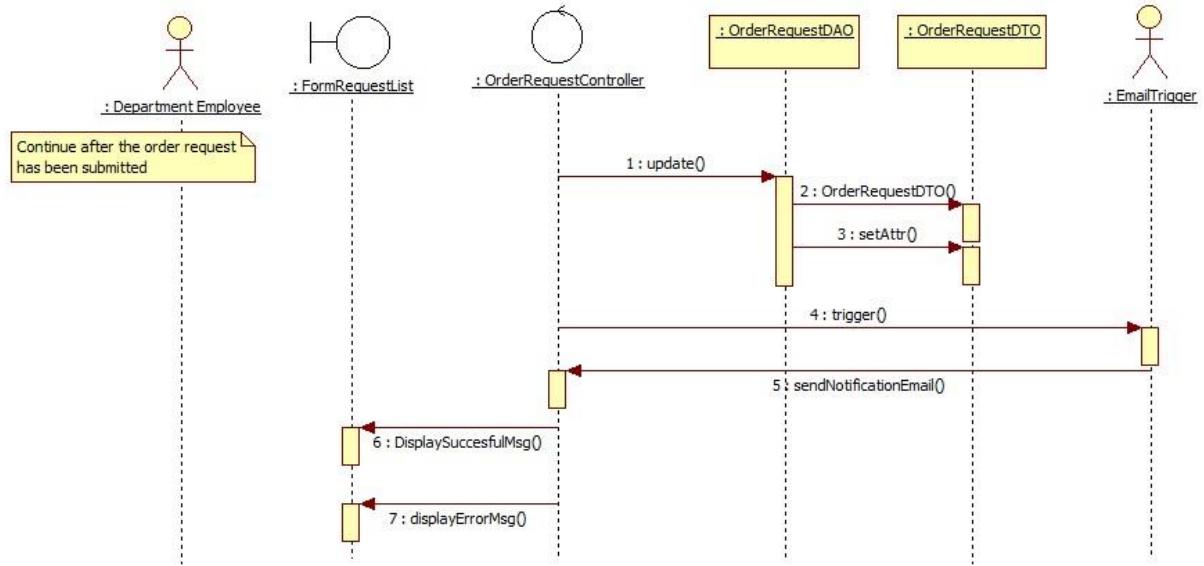
### 2.3.1.2.7 VIEW REQUESTS



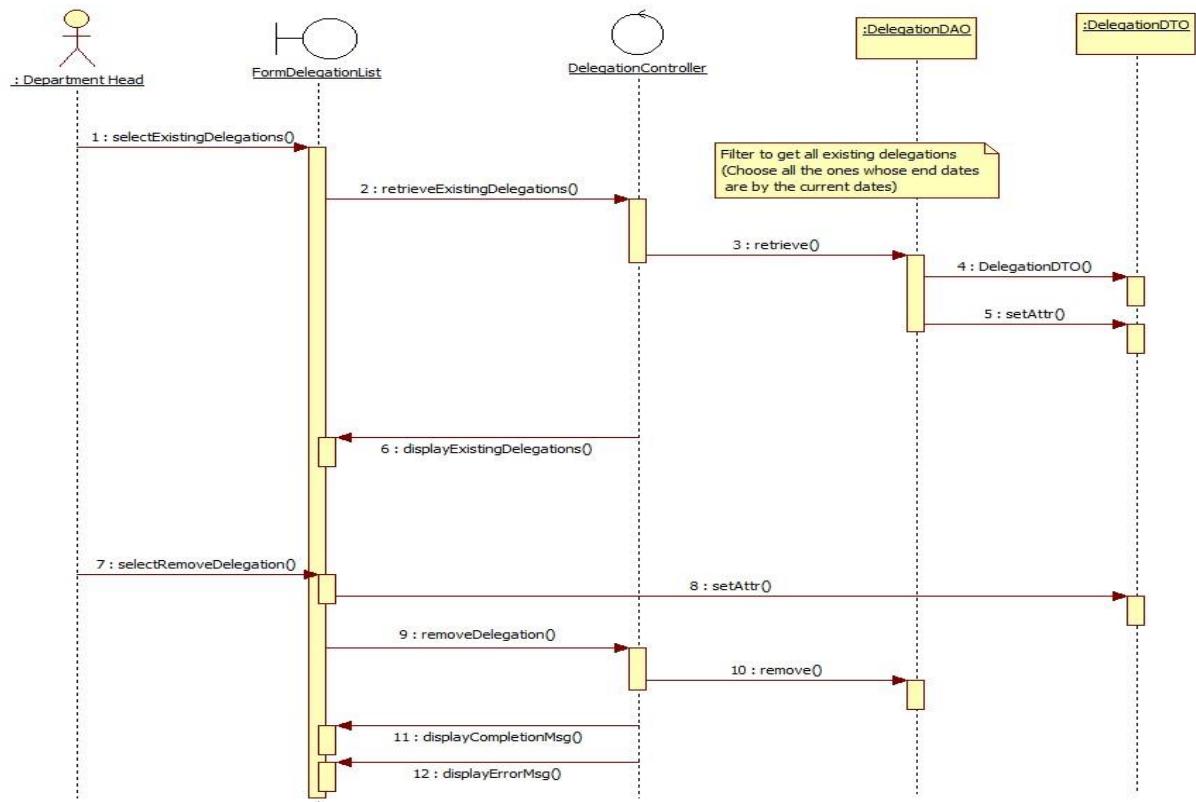
### 2.3.1.2.8 APPROVE/ REJECT ORDER REQUESTS



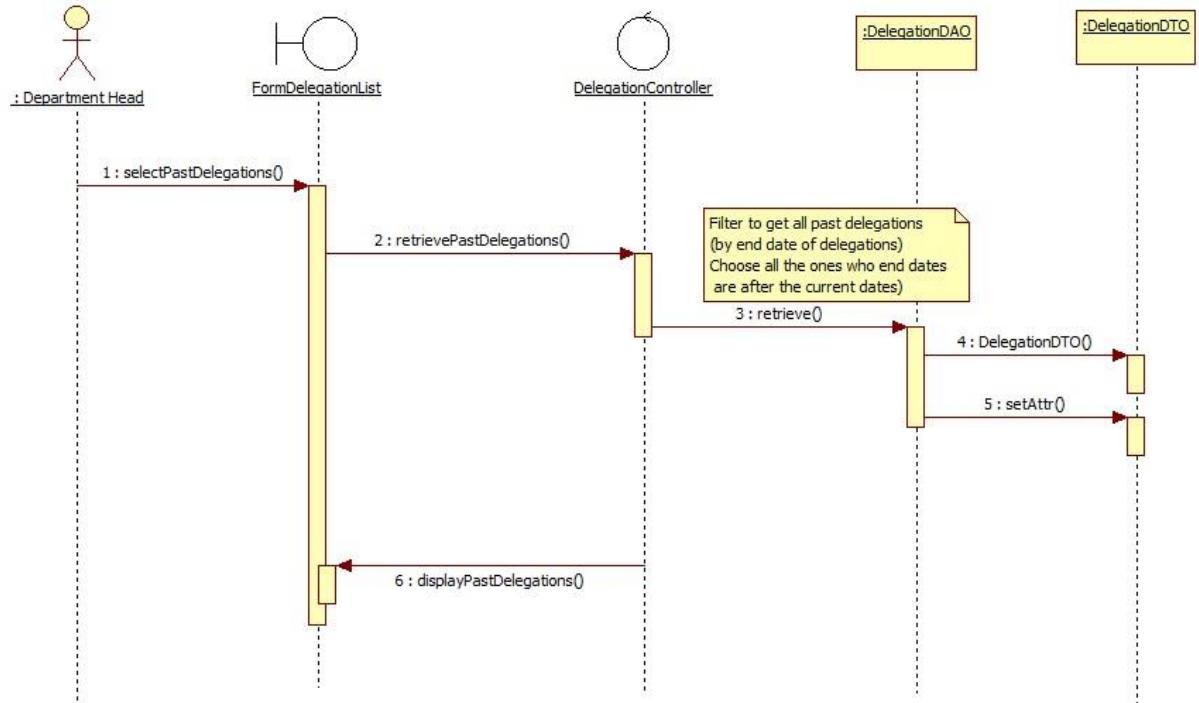
### 2.3.1.2.9 EMAIL NOTIFICATIONS



### 2.3.1.2.10 VIEW/ CANCEL EXISTING DELEGATIONS



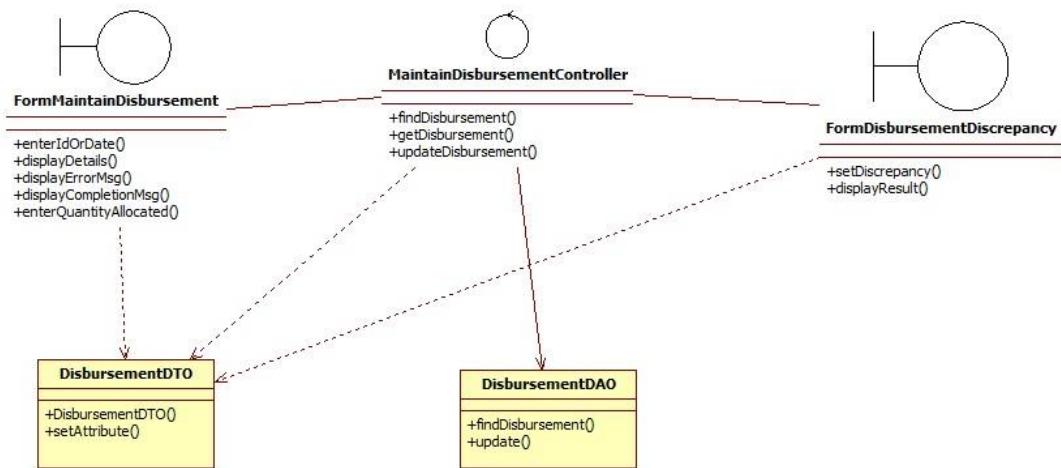
### 2.3.1.2.11 VIEW PAST DELEGATIONS



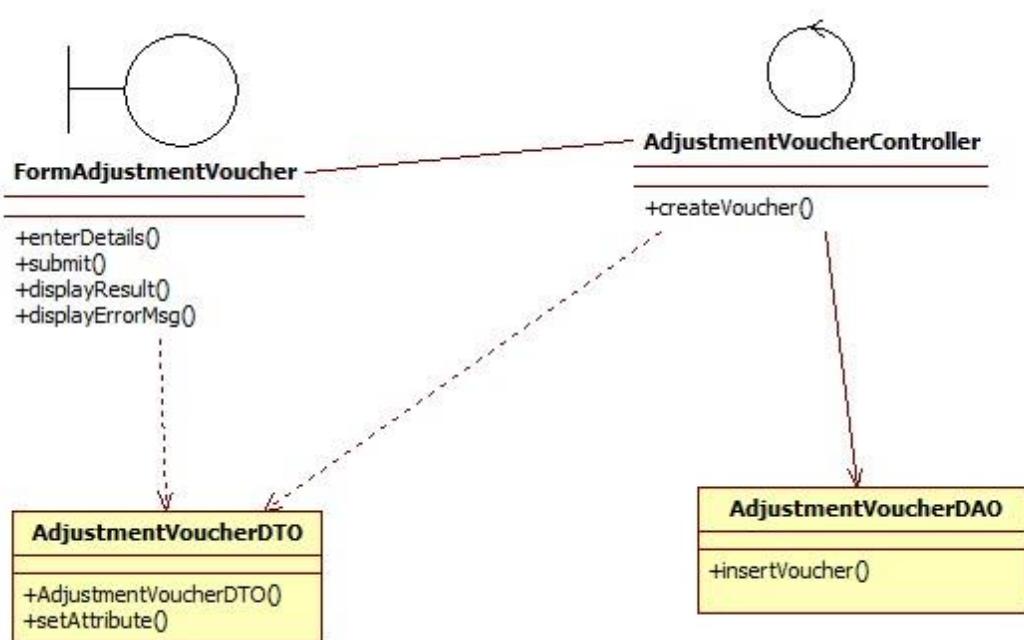
## 2.3.2 ANALYSIS CLASS DIAGRAM

### 2.3.2.1 STORE CLASS DIAGRAMS

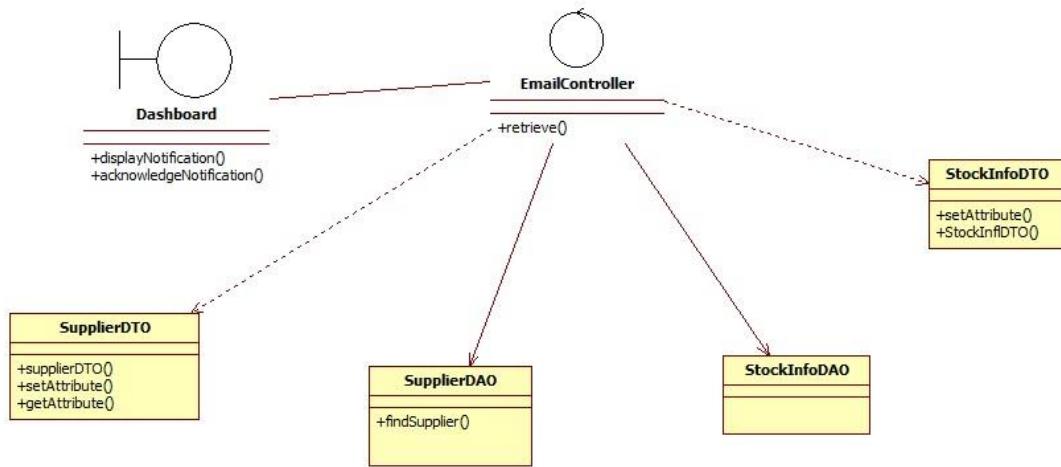
#### 2.3.2.1.1 MAINTAIN DISBURSEMENT



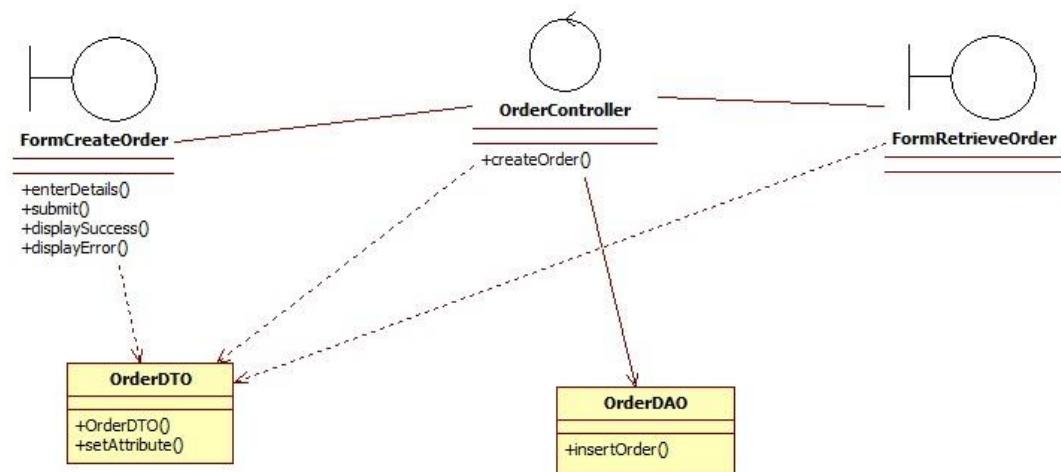
#### 2.3.2.1.2 SHOW ADJUSTMENT VOUCHER



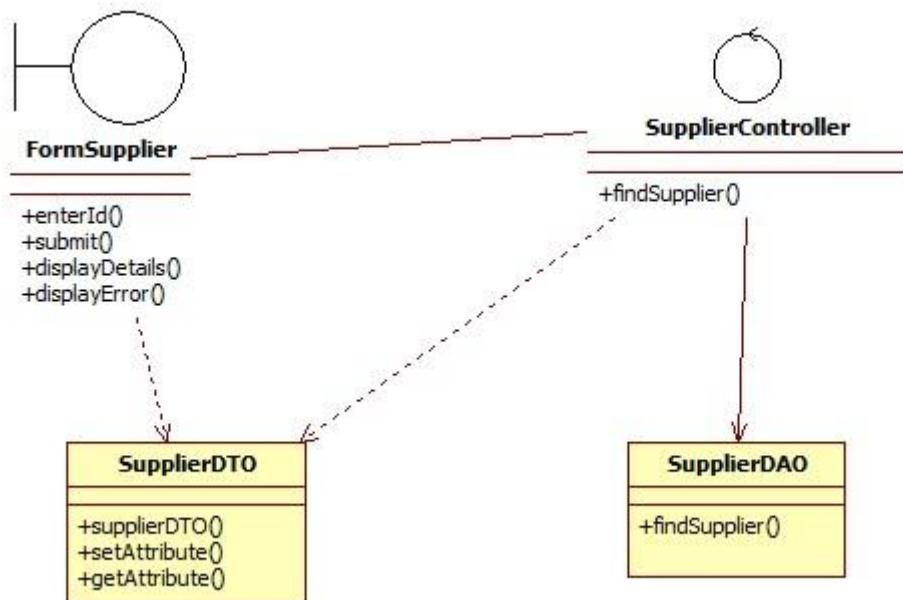
### 2.3.2.1.3 EMAIL NOTIFICATIONS ABOUT INVENTORY



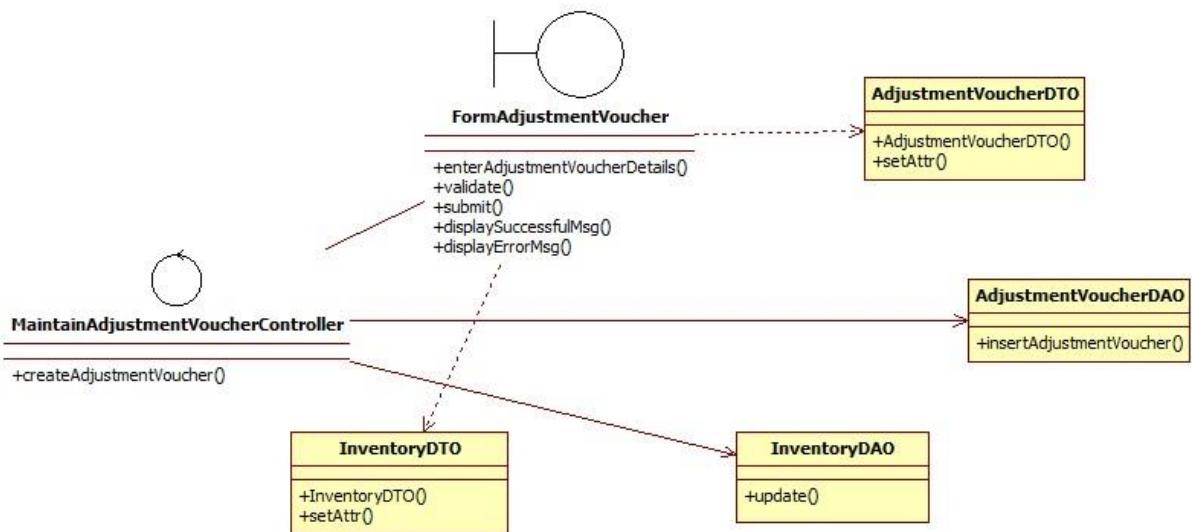
### 2.3.2.1.4 CREATE AND RETRIEVE ORDERS



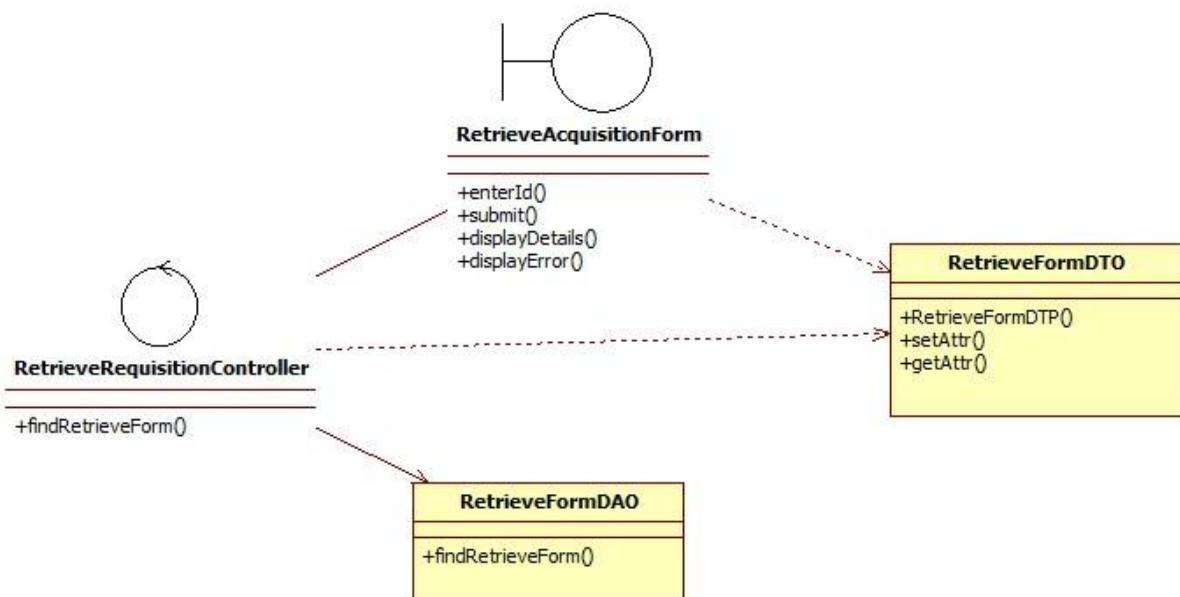
### 2.3.2.1.5 RETRIEVE SUPPLIERS



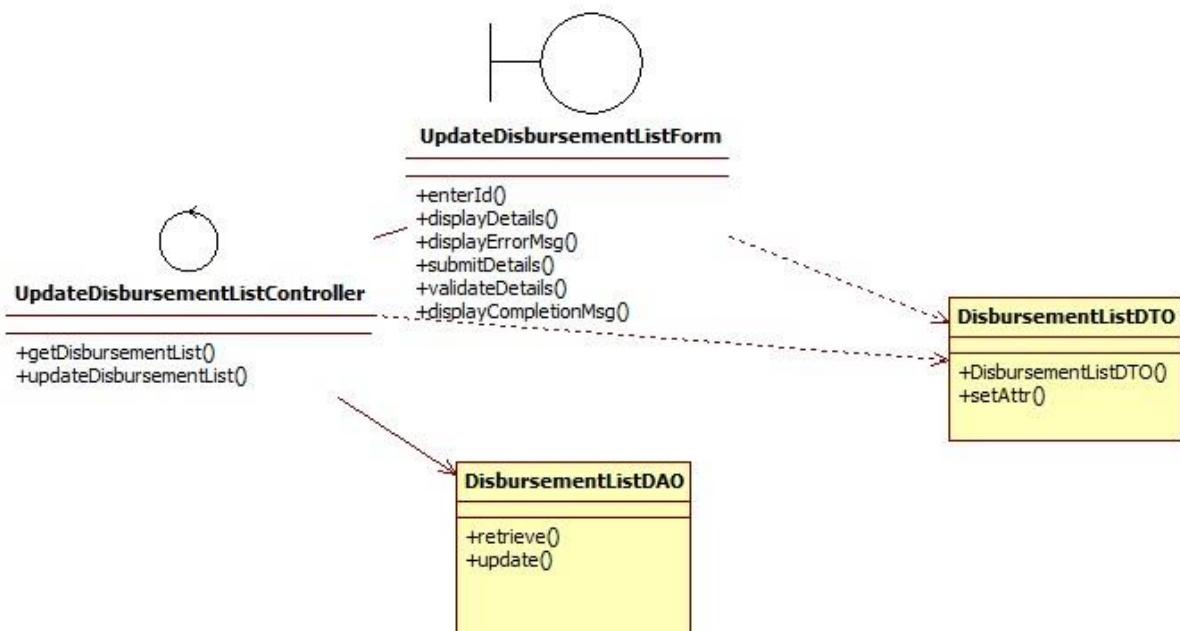
### 2.3.2.1.6 RAISE ADJUSTMENT VOUCHER



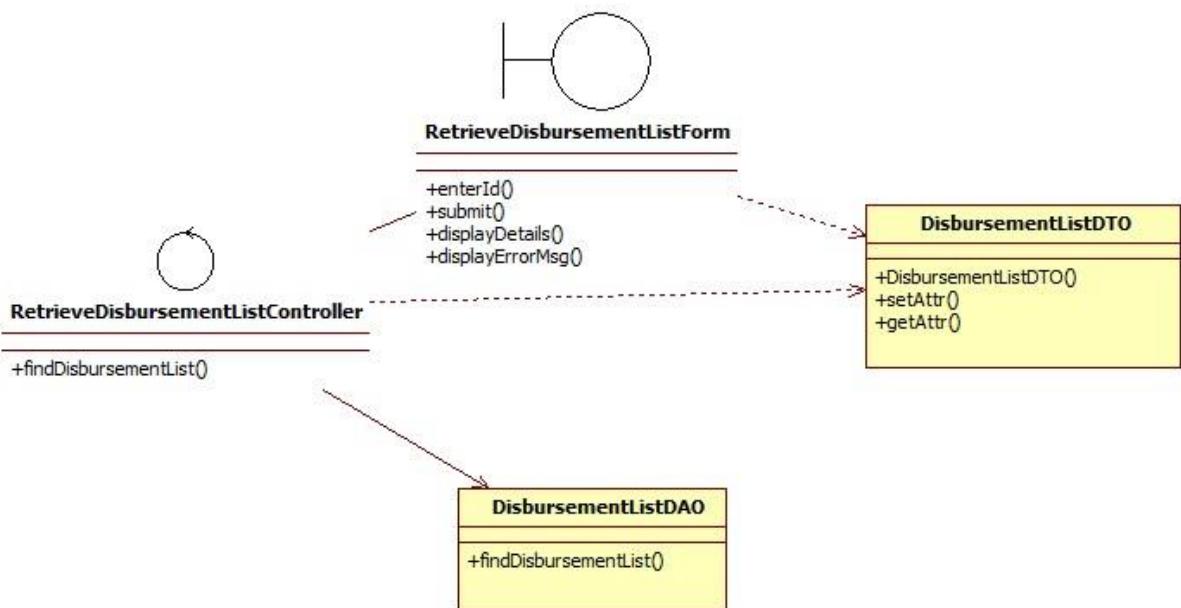
### 2.3.2.1.7 RETRIEVE REQUISITION FORM



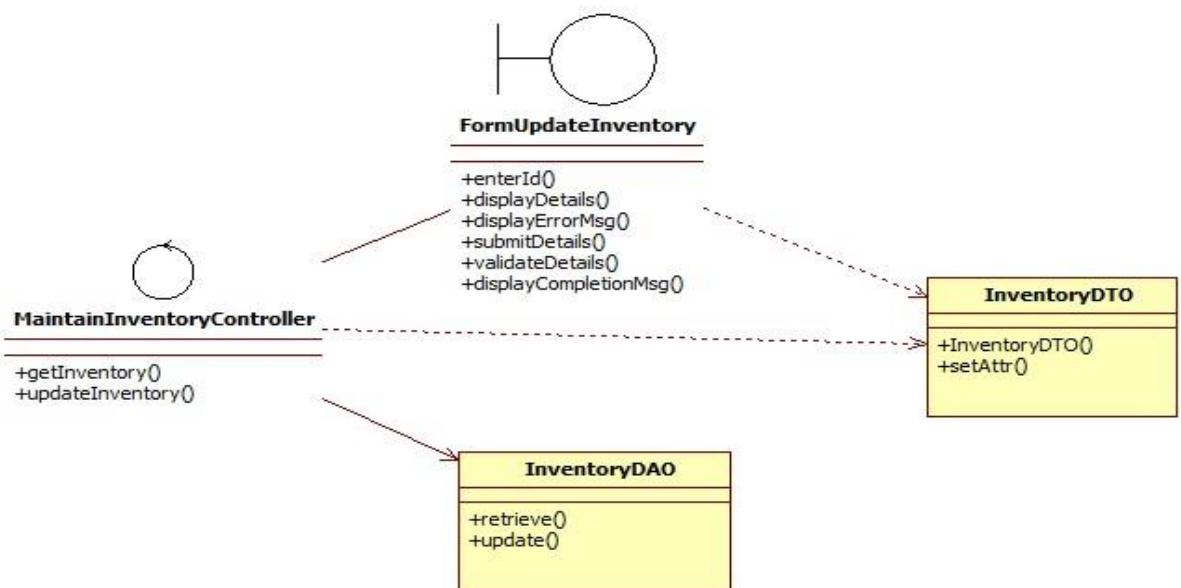
### 2.3.2.1.8 UPDATE DISBURSEMENT LIST



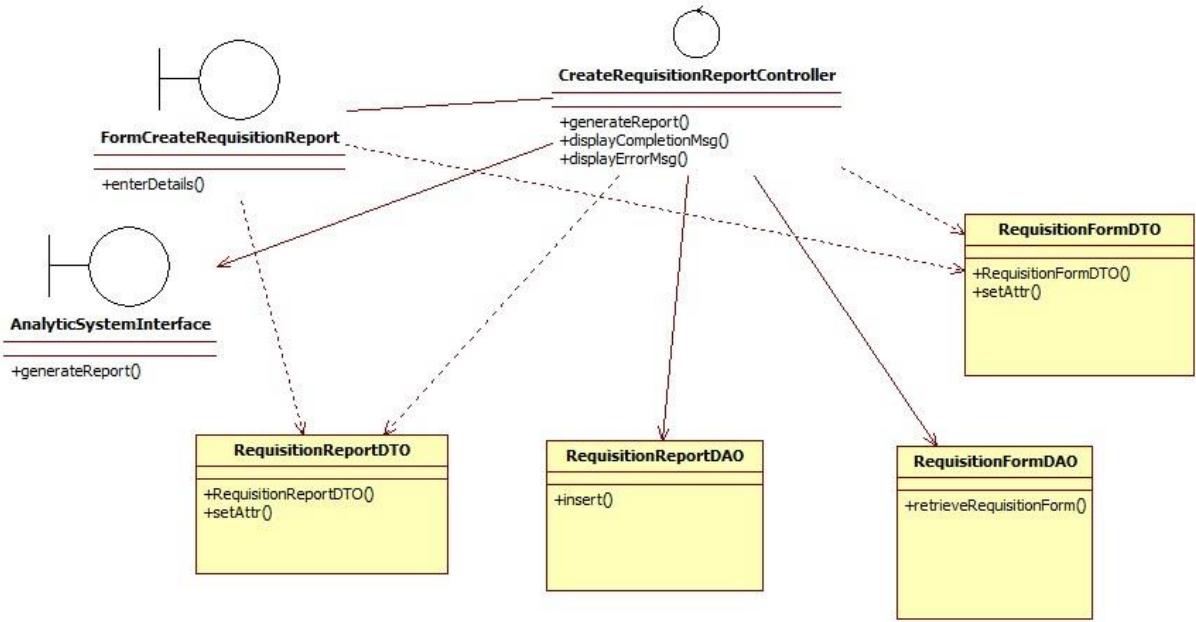
### 2.3.2.1.9 RETRIEVE DISBURSEMENT LIST



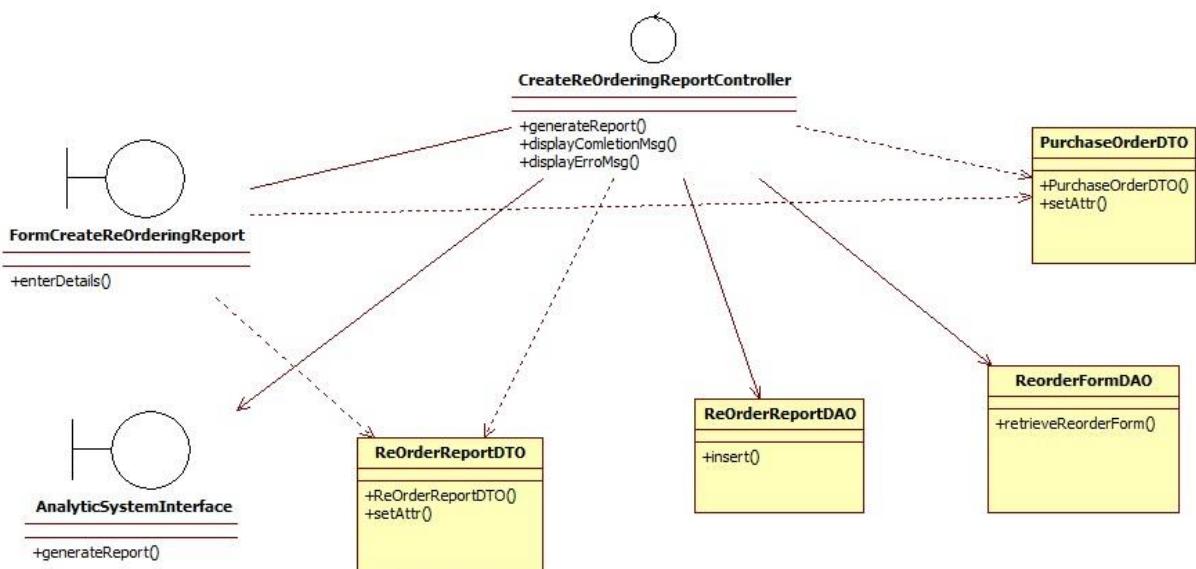
### 2.3.2.1.10 UPDATE INVENTORY



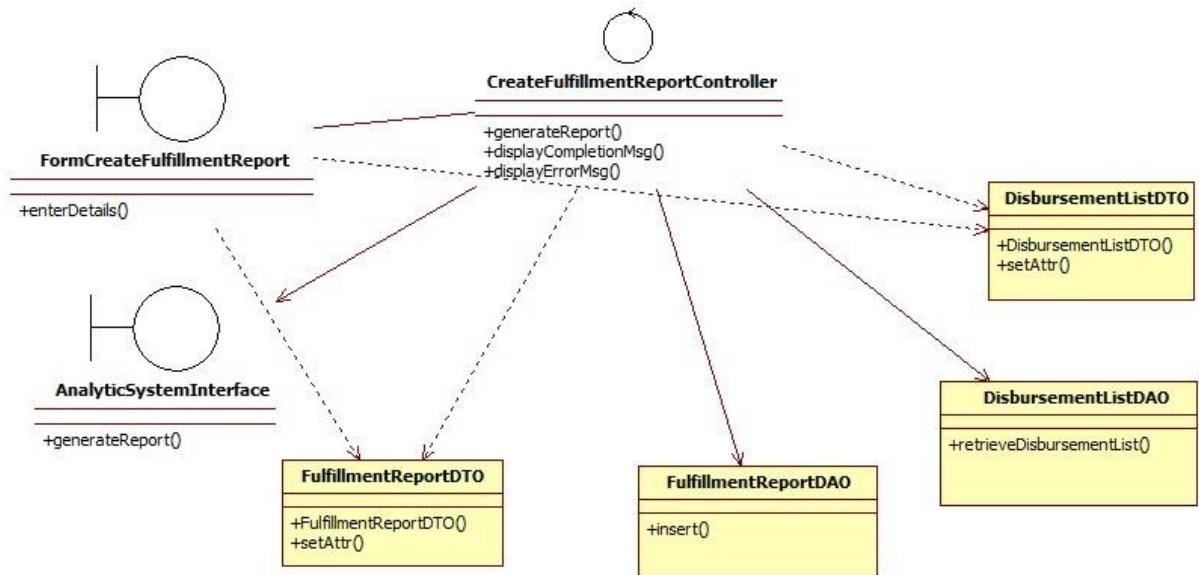
### 2.3.2.1.11 CREATE REQUISITION REPORT



### 2.3.2.1.12 CREATE RE-ORDERING REPORT

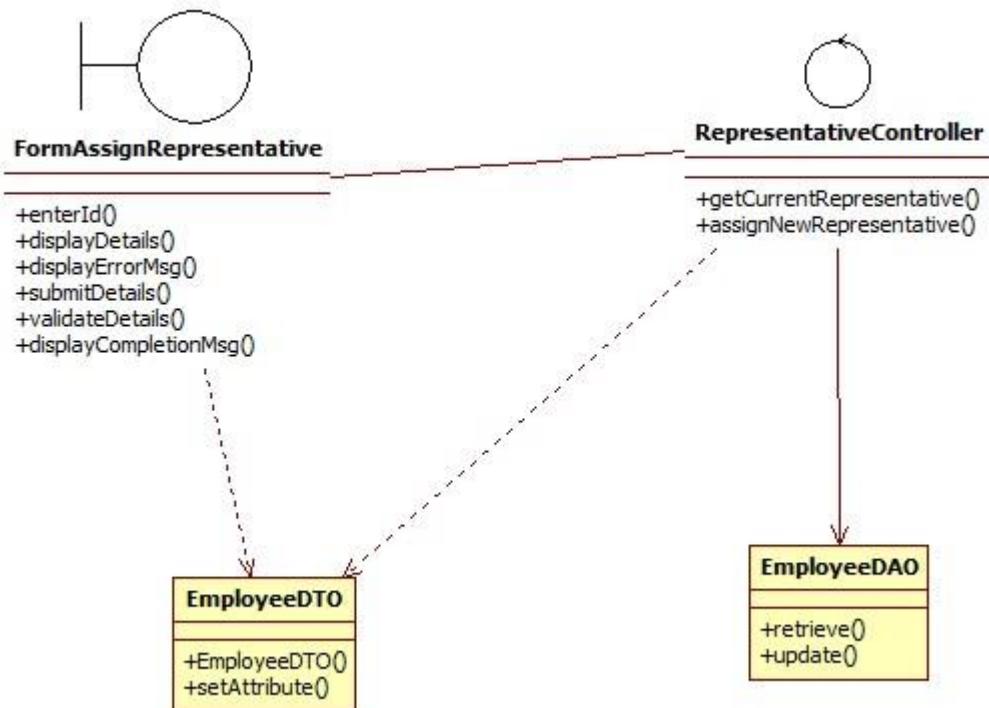


### 2.3.2.1.13 CREATE FULFILLMENT REPORT

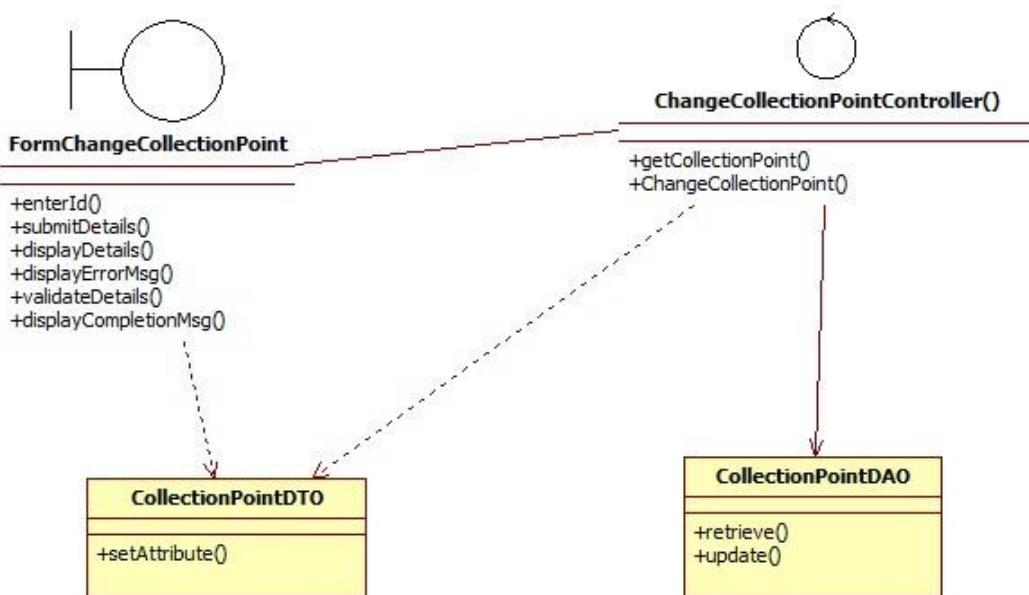


## 2.3.2.2 DEPARTMENT CLASS DIAGRAMS

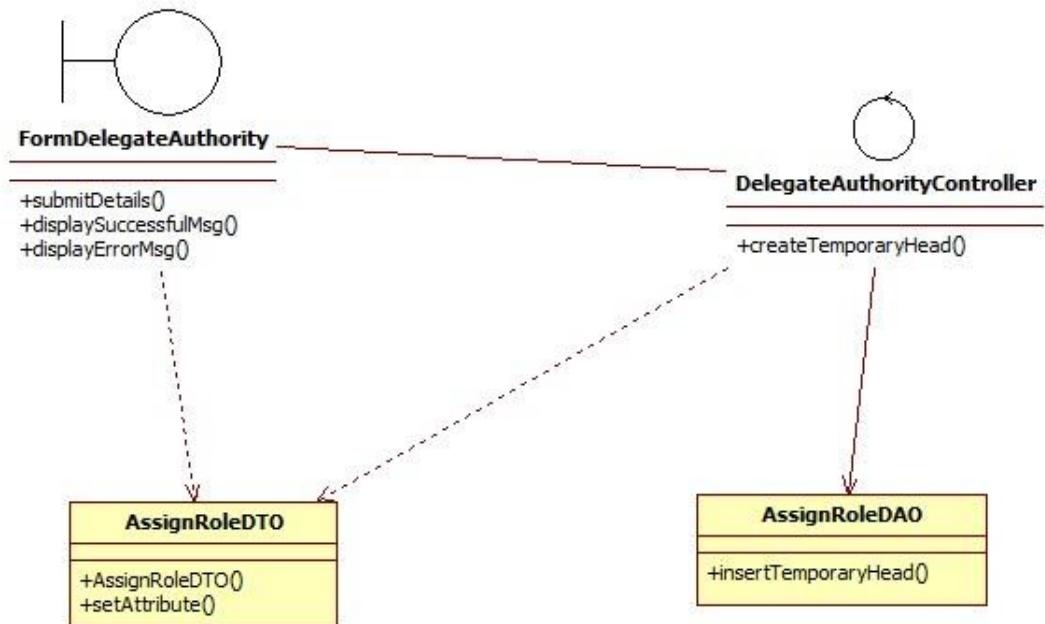
### 2.3.2.2.1 ASSIGN REPRESENTATIVE



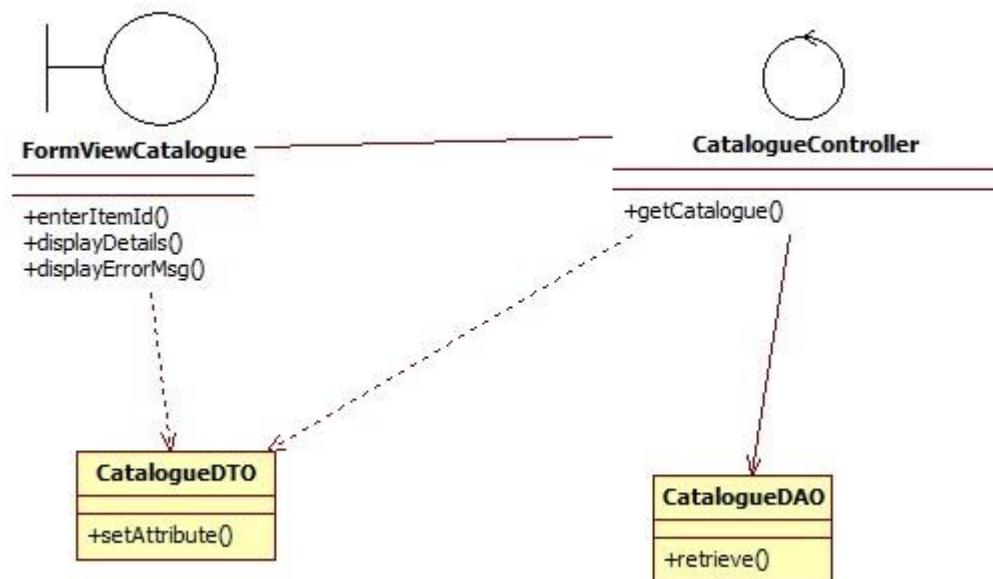
### 2.3.2.2.2 CHANGE COLLECTION POINT



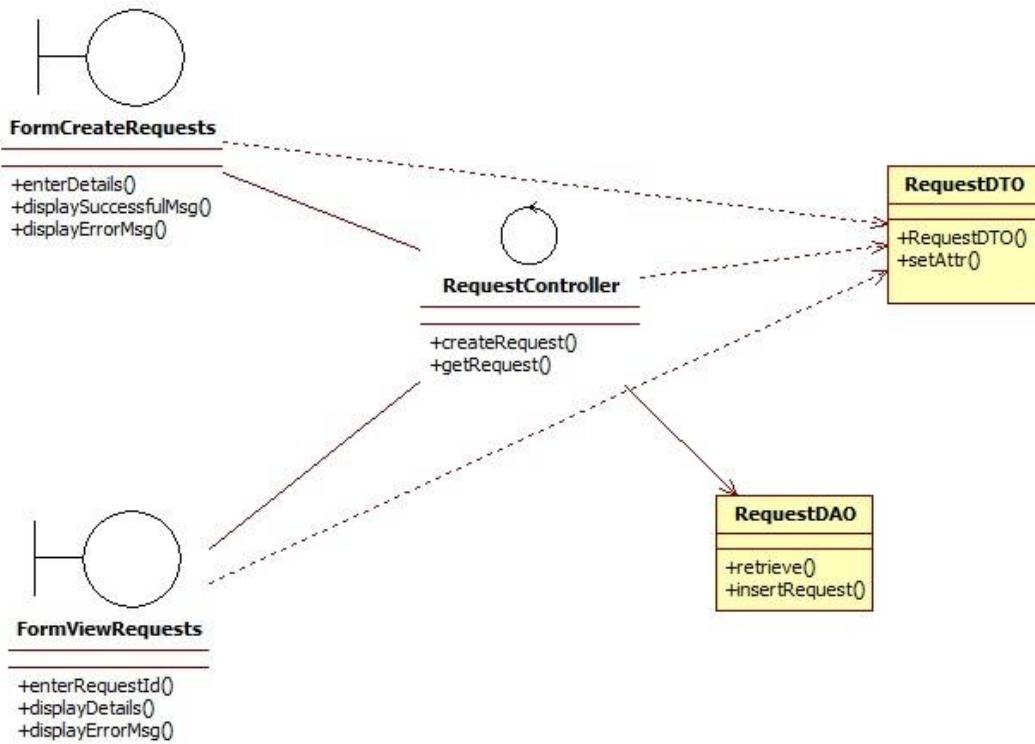
### 2.3.2.2.3 DELEGATE AUTHORITY



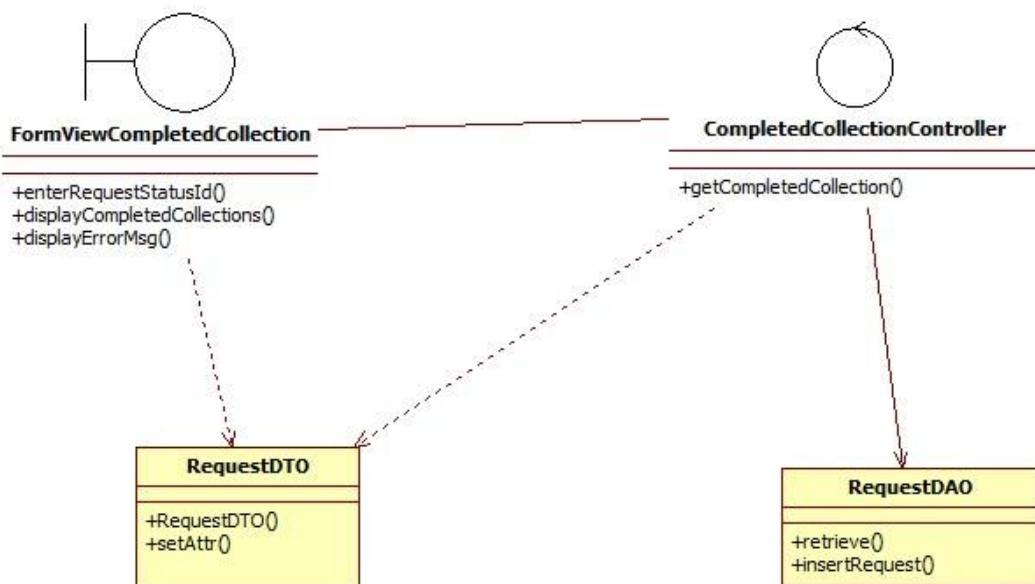
### 2.3.2.2.4 VIEW CATALOGUE



### 2.3.2.2.5 CREATE REQUEST

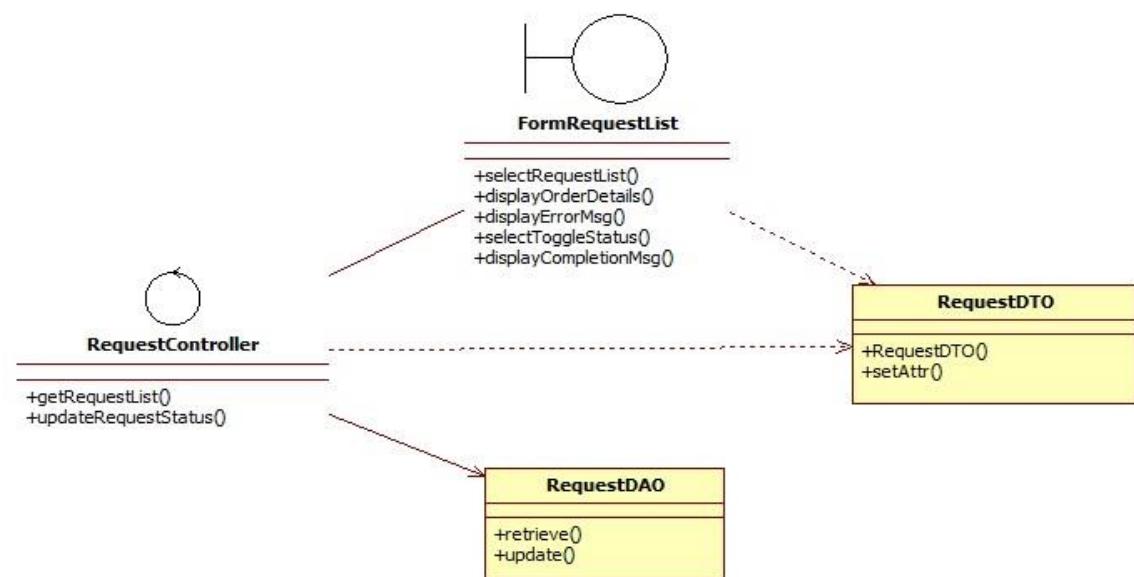


### 2.3.2.2.6 VIEW COMPLETED COLLECTION

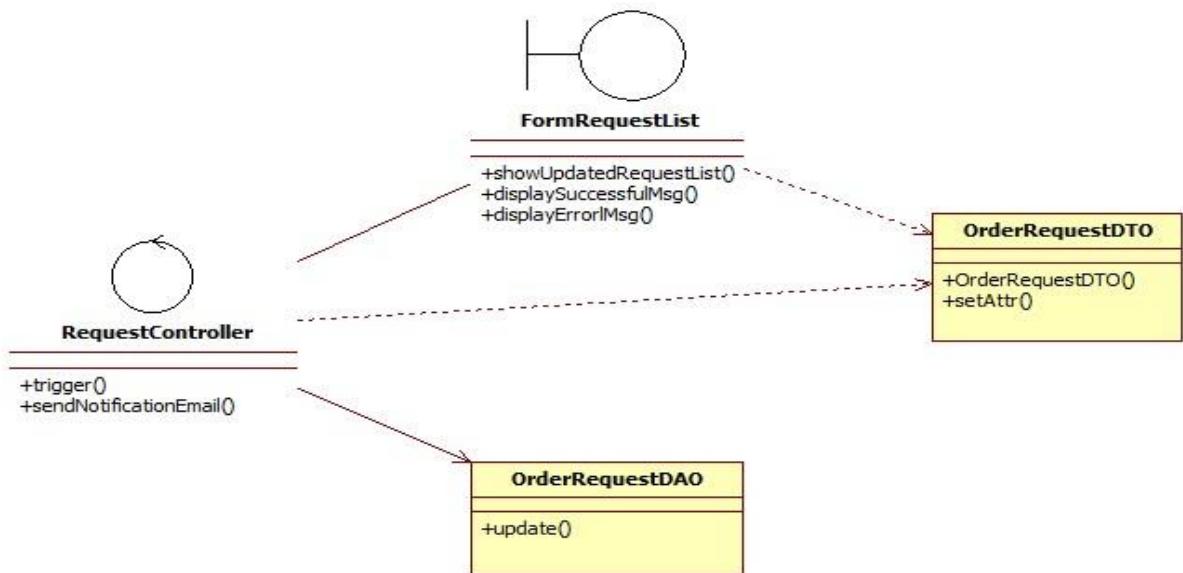


### 2.3.2.7 APPROVE/ REJECT ORDER REQUESTS

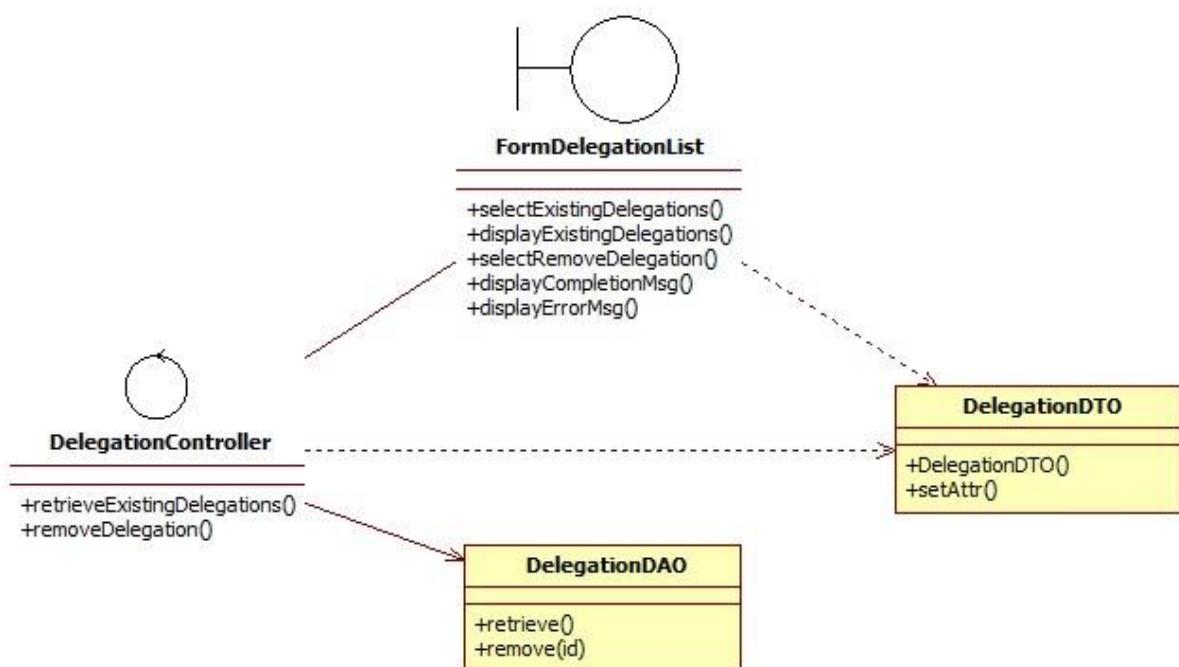
Approve/ Reject Requests



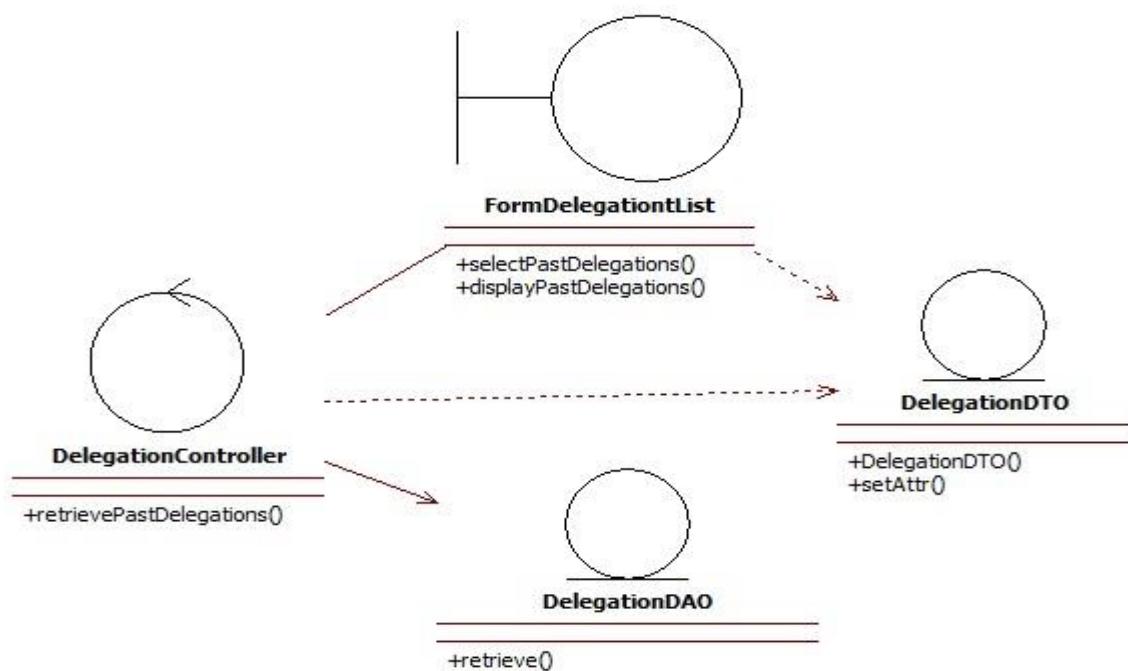
### 2.3.2.8 EMAIL NOTIFICATIONS



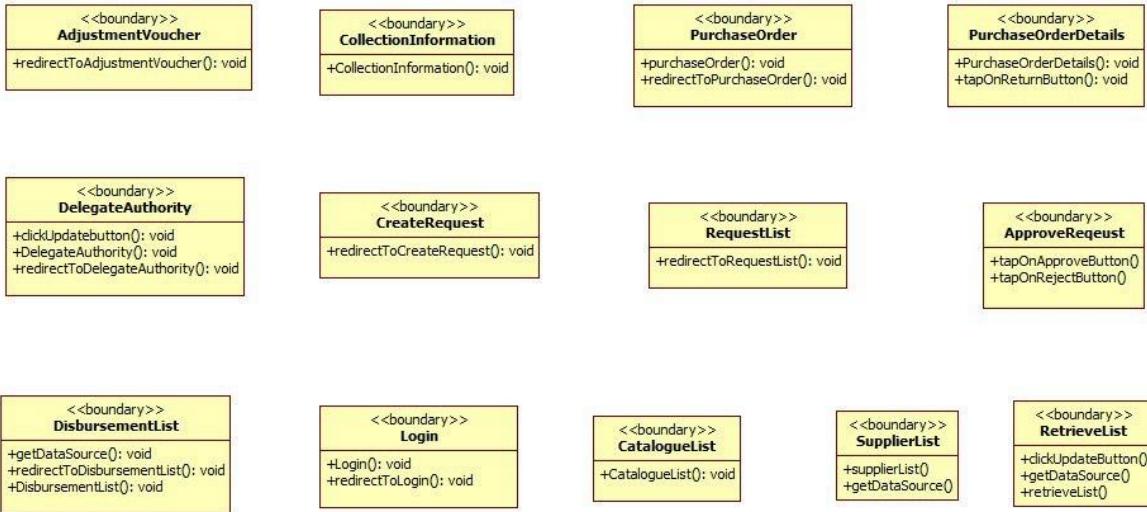
### 2.3.2.9 VIEW/ CANCEL EXISTING DELEGATIONS



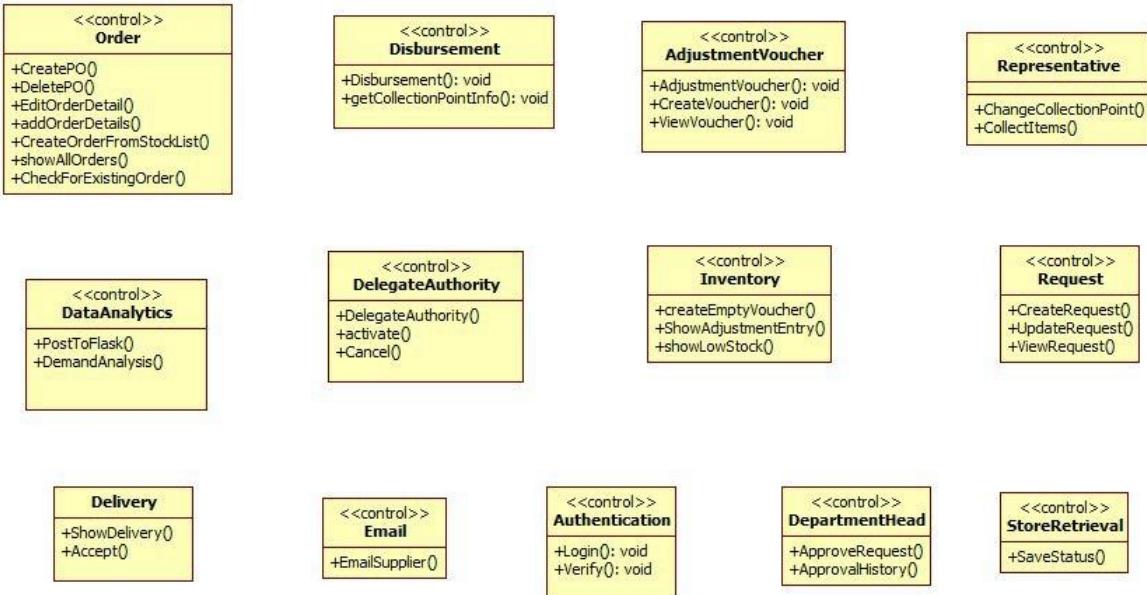
### 2.3.2.10 VIEW PAST DELEGATIONS



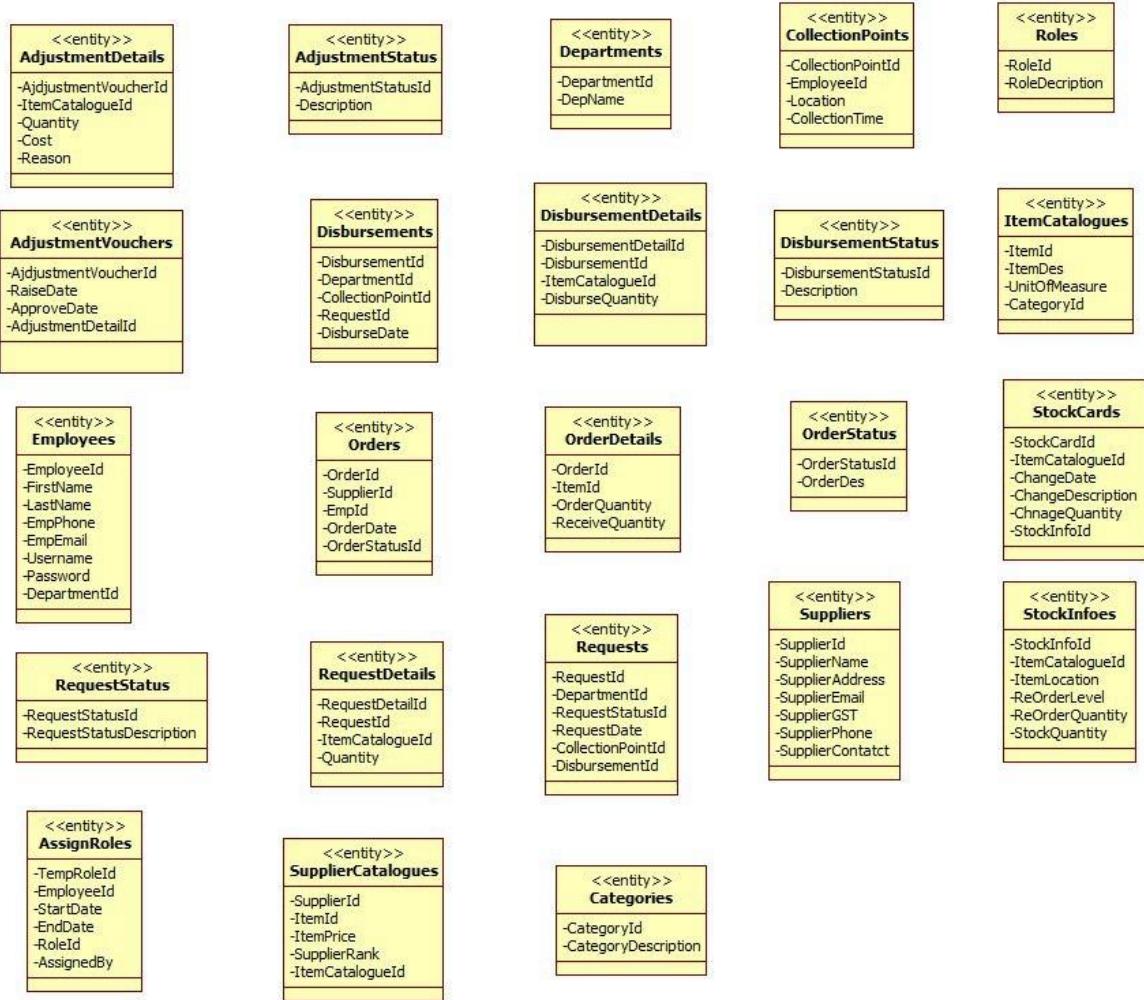
### 2.3.2.3 BOUNDARY CLASS DIAGRAMS



### 2.3.2.4 CONTROL CLASS DIAGRAMS

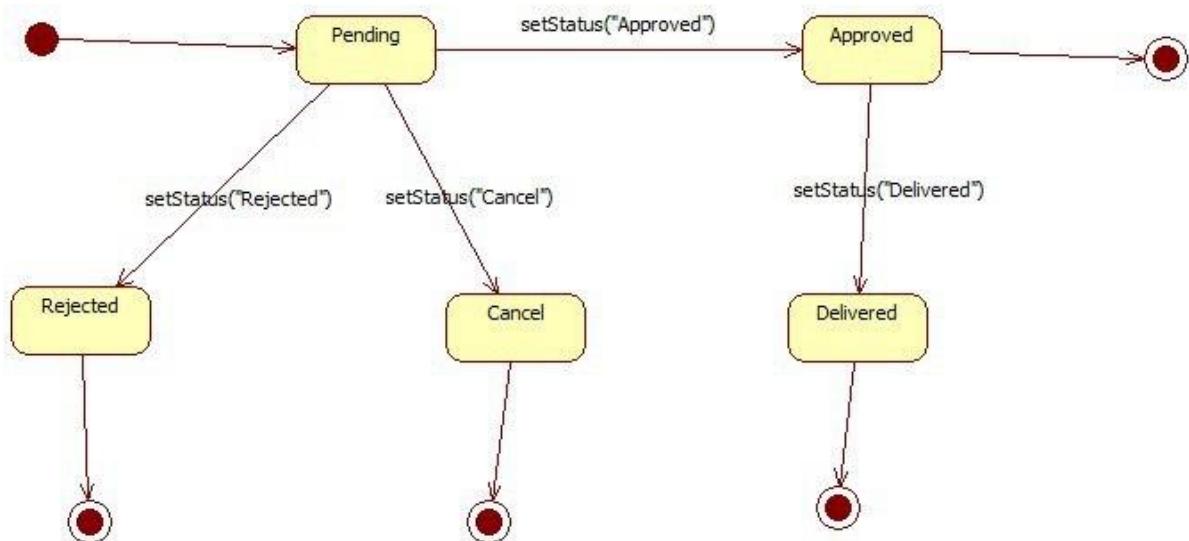


### 2.3.2.5 ENTITY CLASS DIAGRAMS

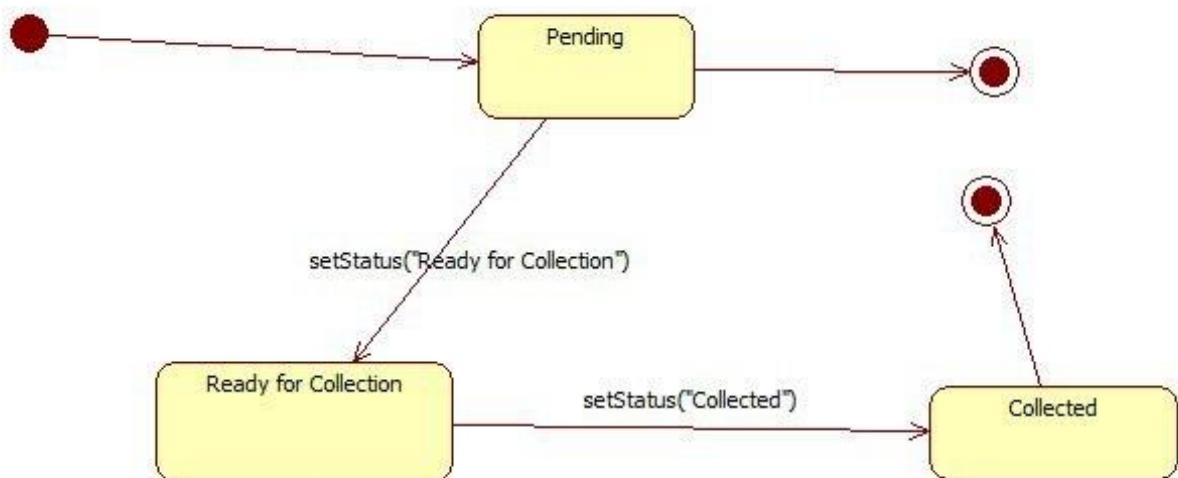


### 2.3.3 STATECHART DIAGRAM

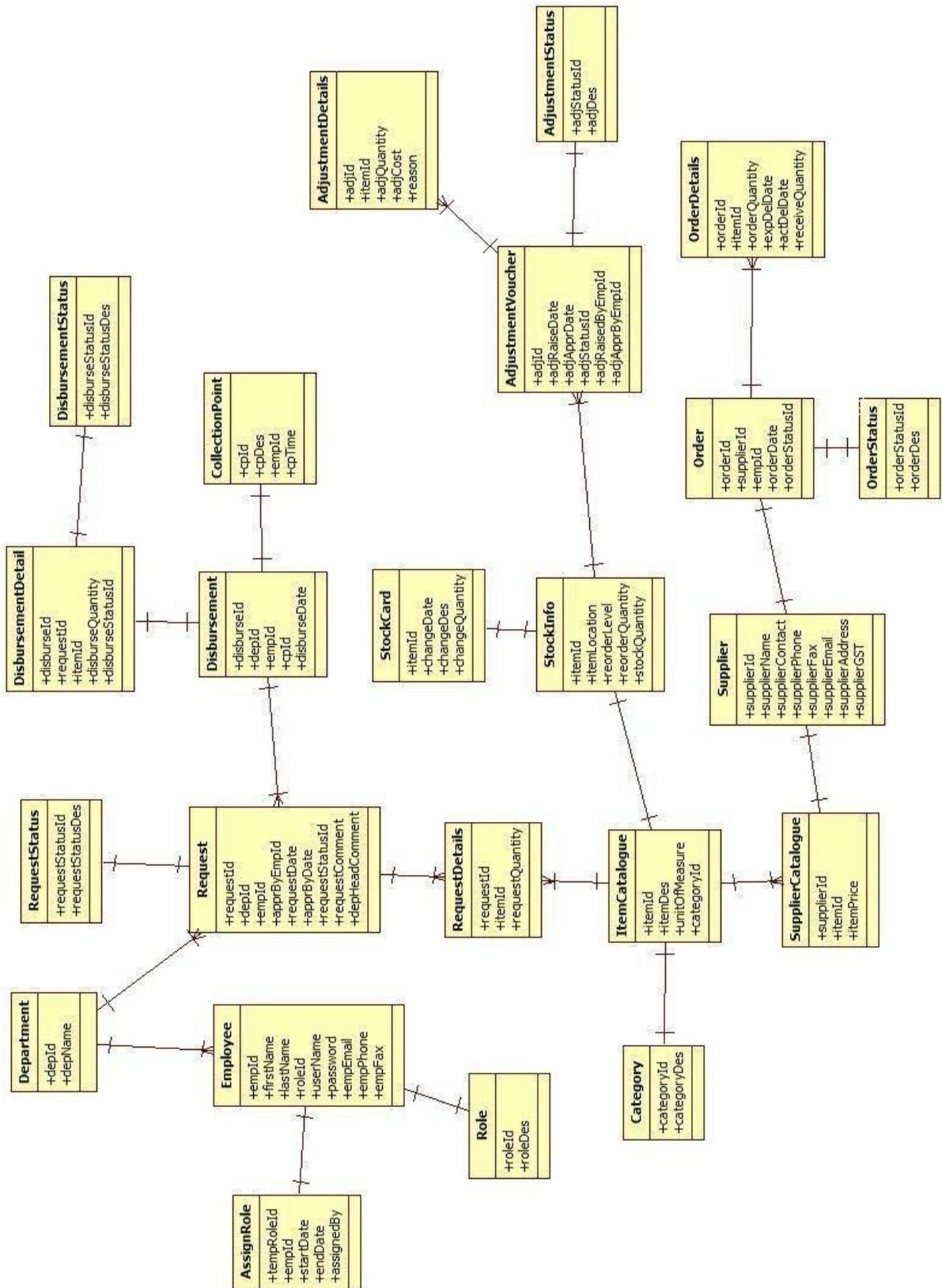
#### 2.3.3.1 ORDER STATUS STATECHART DIAGRAM



#### 2.3.3.1 DISBURSEMENT STATUS STATECHART DIAGRAM



### 2.3.4 RELATIONAL DATABASE DESIGN



## **2.4 DESIGN WORKFLOW**

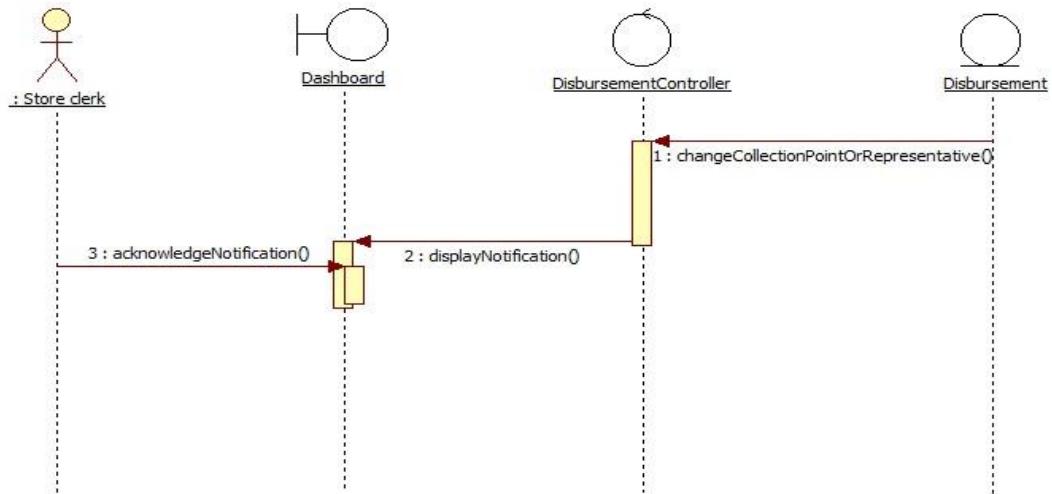
### **2.4.1 ARCHITECTURAL PLATFORM**

Unified Modeling Language(UML) Tool	WhiteStarUML
Project Management Tool	Microsoft Project
Language	C#(Web), Java(Android), UML(Design)
Server-Side Web Application framework	ASP.NET MVC
Front-End Design Frameworks	Bootstrap
Database	Microsoft SQL
Database Tools	Entity Framework, SQL Management Studio
Client Side Tools	Microsoft Visual Studio, Android Studio
Analysis Tools	Python IDE, PyCharm
Mailing Tool	Mailing Software

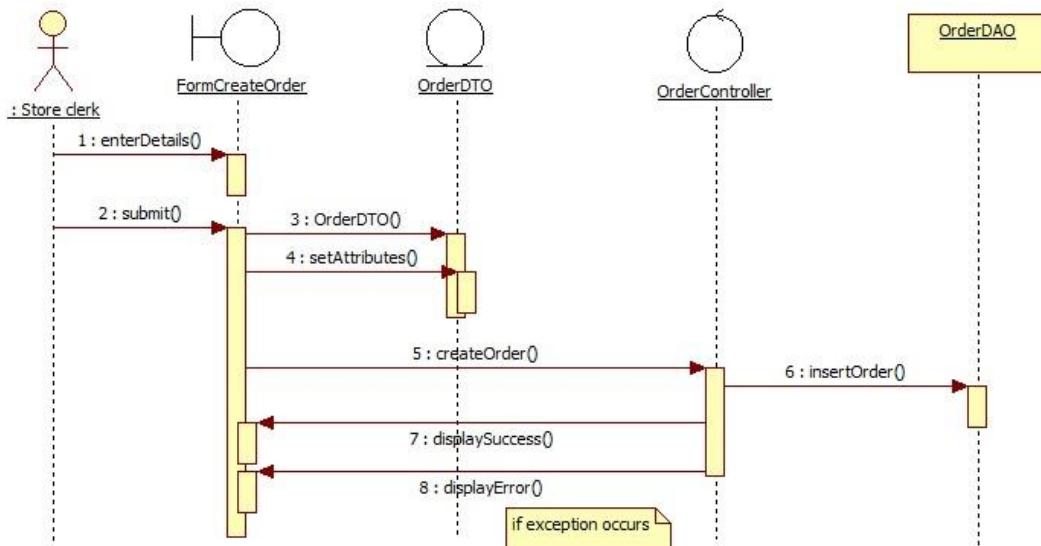
## 2.4.2 SEQUENCE DIAGRAM

### 2.4.2.1 STORE SEQUENCE DIAGRAMS

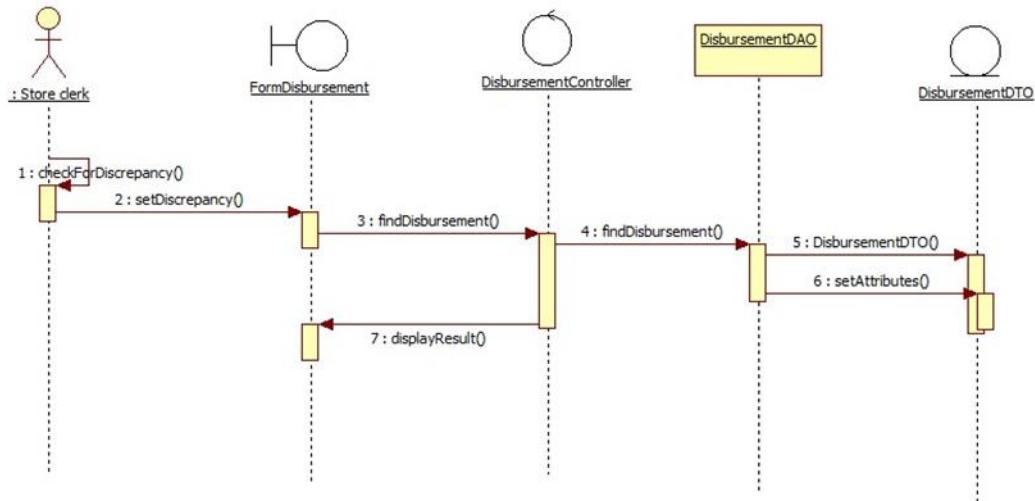
#### 2.4.2.1.1 COLLECTION NOTIFICATION



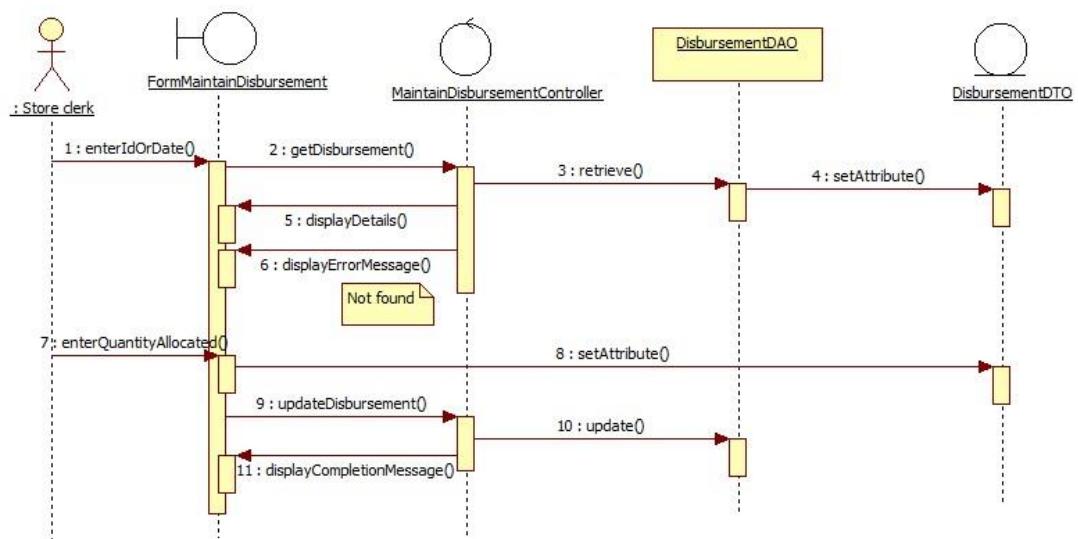
#### 2.4.2.1.2 CREATE ORDERS



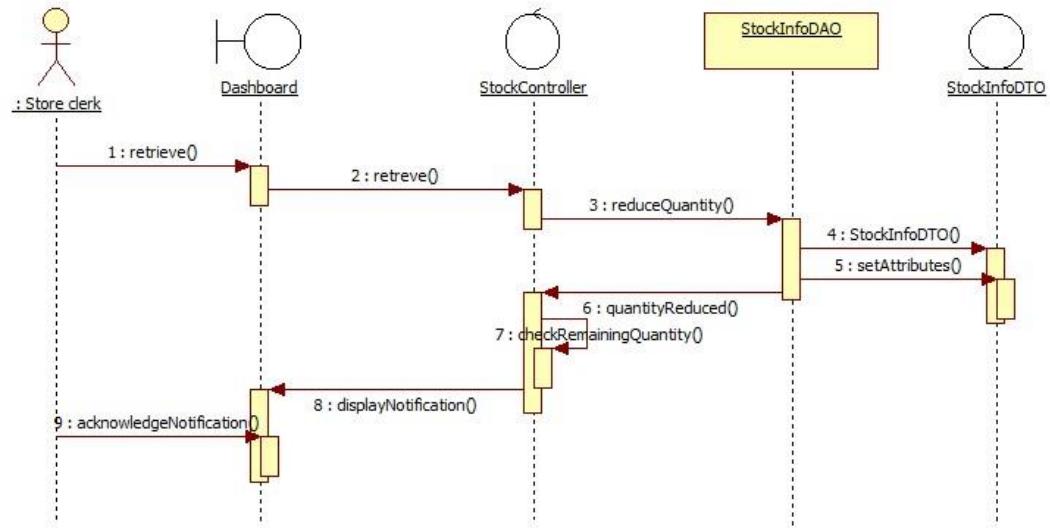
### 2.4.2.1.3 DISBURSEMENT DISCREPANCY



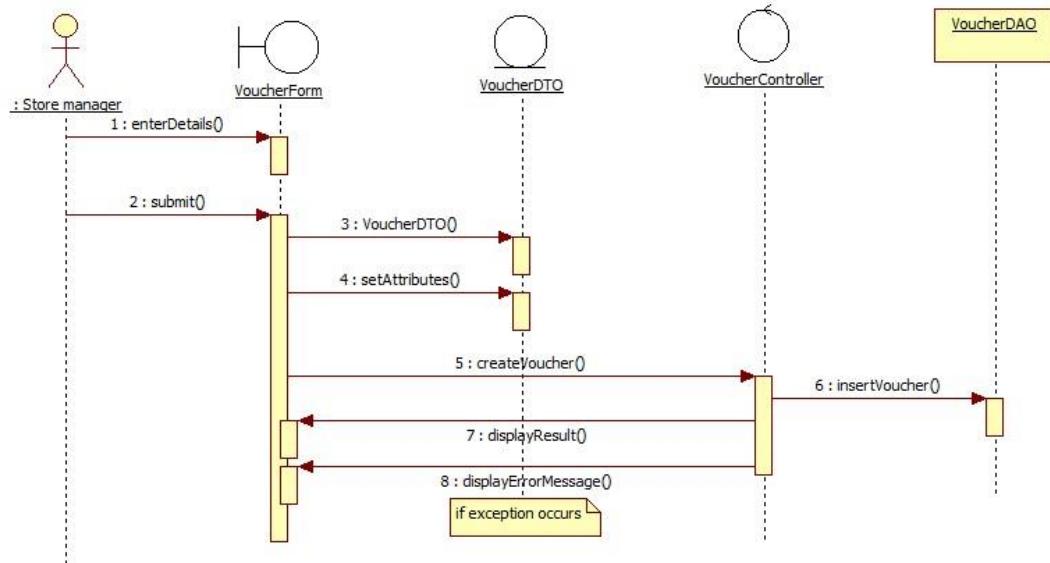
### 2.4.2.1.4 DISBURSEMENT STATIONERY



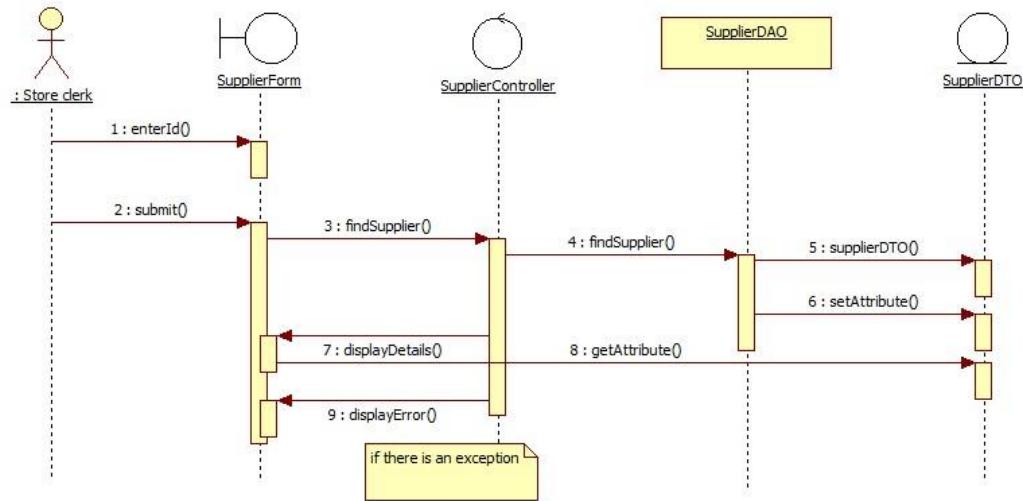
### 2.4.2.1.5 STOCK NOTIFICATION



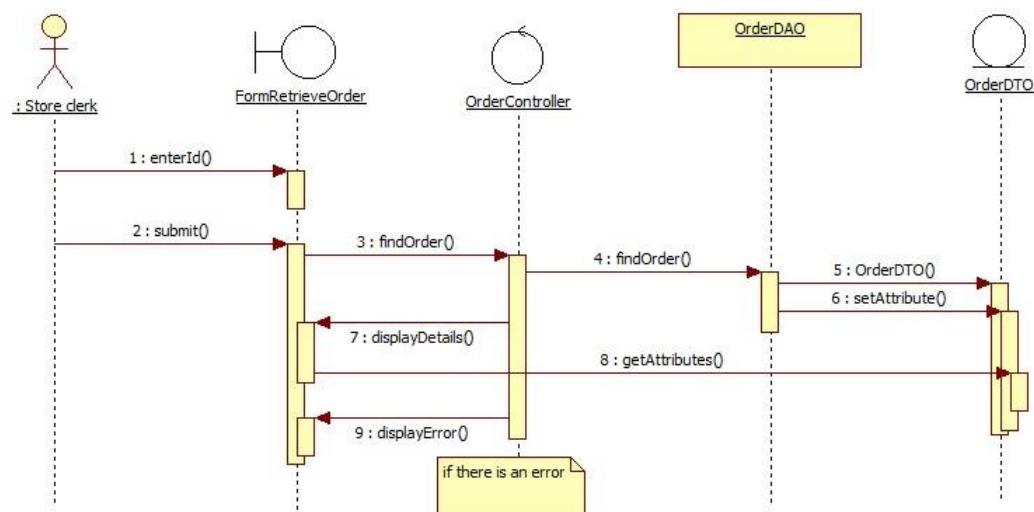
### 2.4.2.1.6 MANAGE ADJUSTMENT VOUCHER



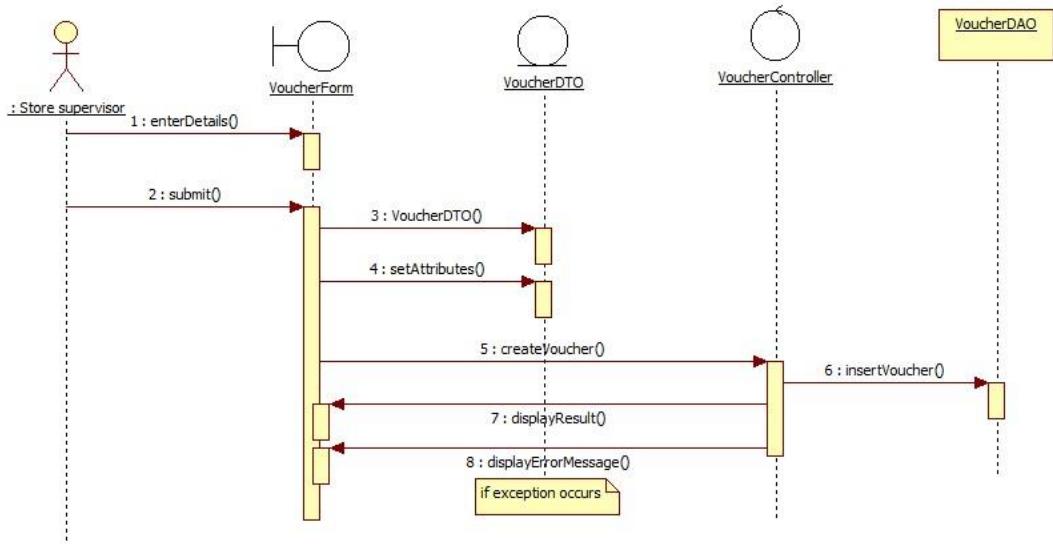
### 2.4.2.1.7 RETRIEVE SUPPLIERS



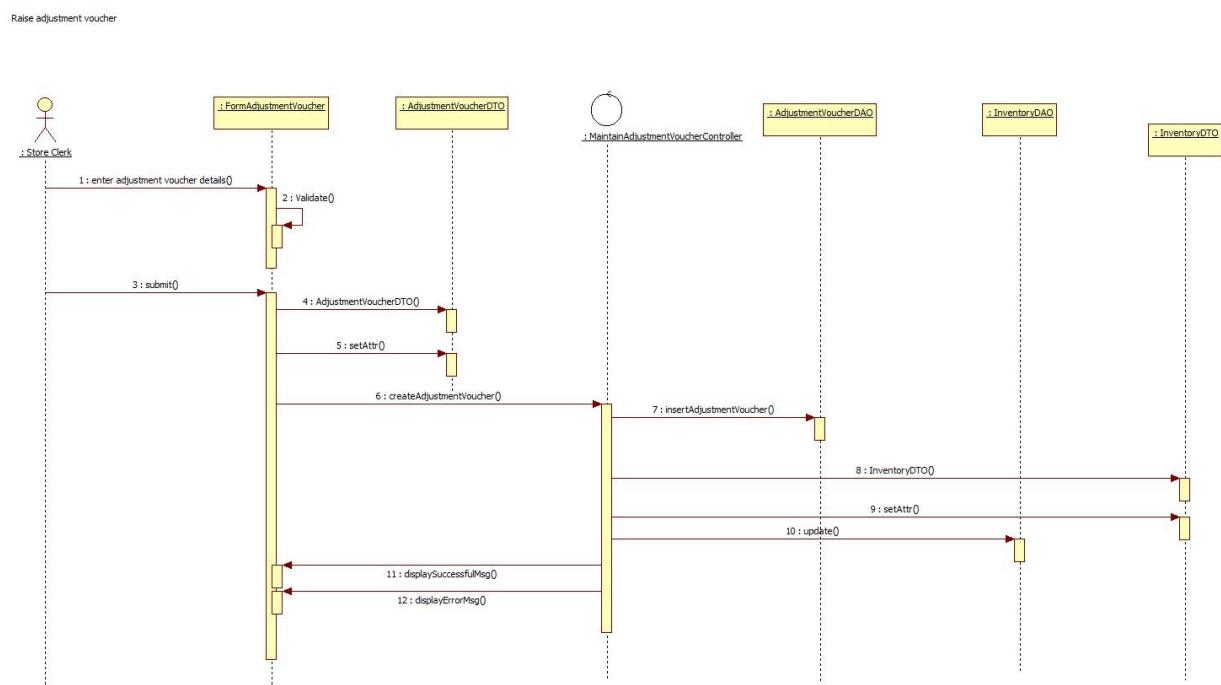
### 2.4.2.1.8 RETRIEVE ORDERS



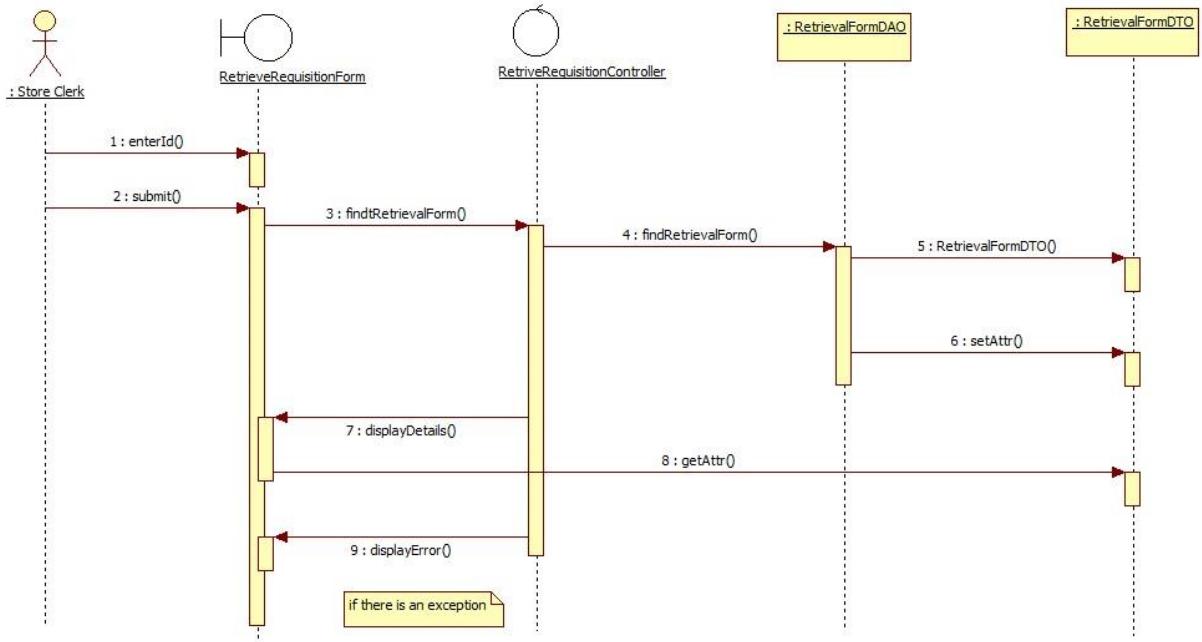
### 2.4.2.1.9 SUPERVISOR ADJUSTMENT VOUCHER SEQUENCE DIAGRAM



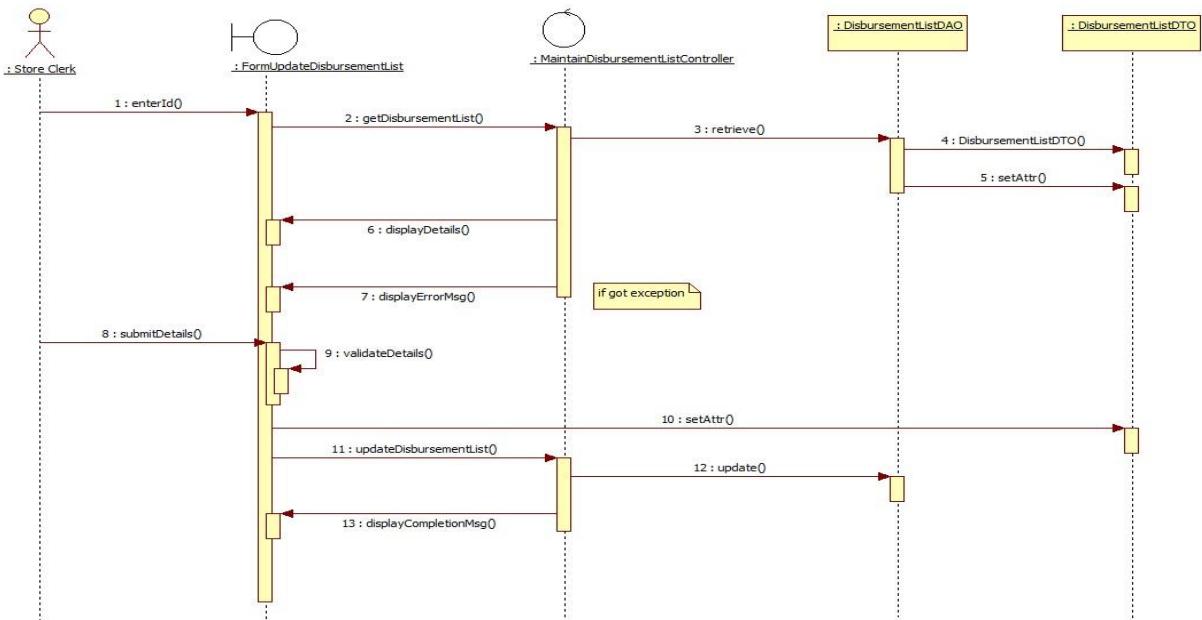
### 2.4.2.1.10 RAISE ADJUSTMENT VOUCHER



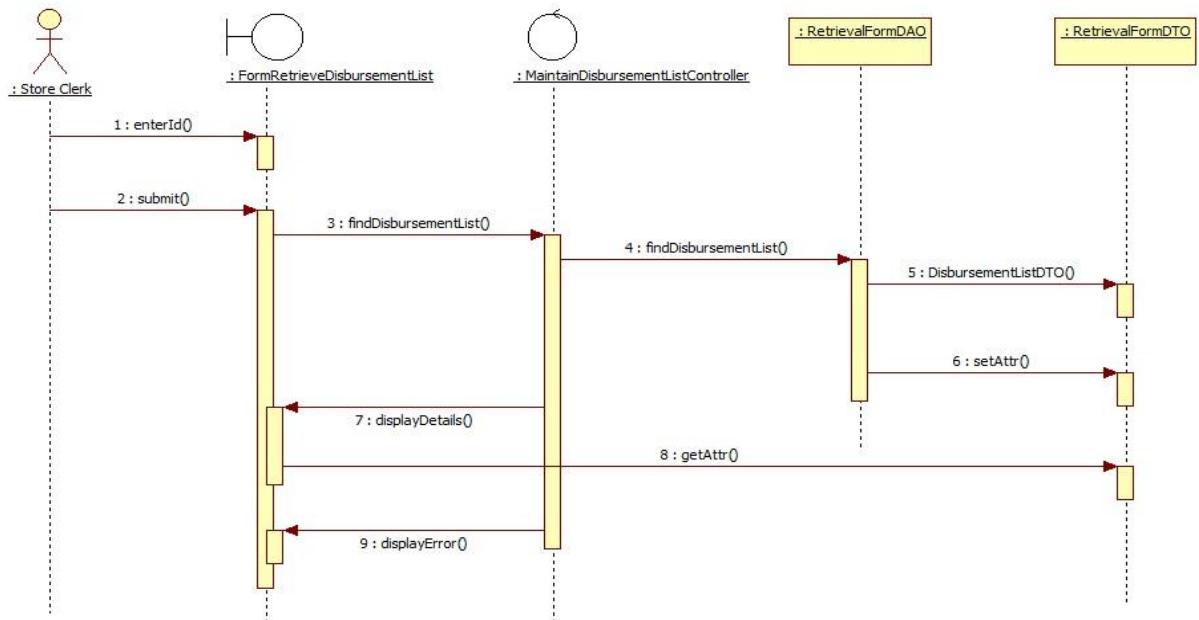
### 2.4.2.1.11 RETRIEVE REQUISITION FORM



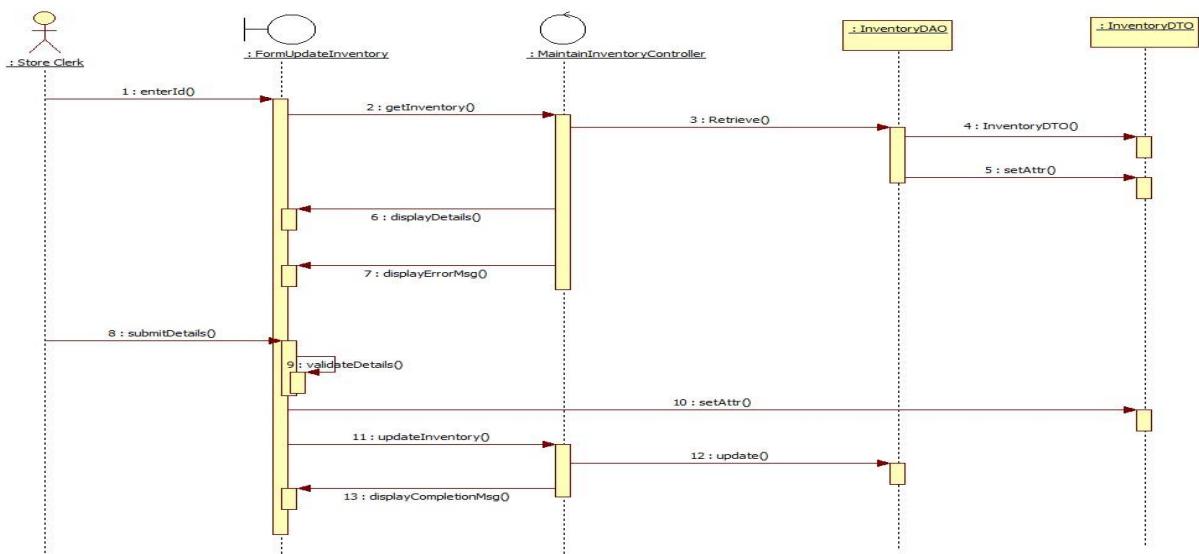
### 2.4.2.1.12 UPDATE DISBURSEMENT LIST



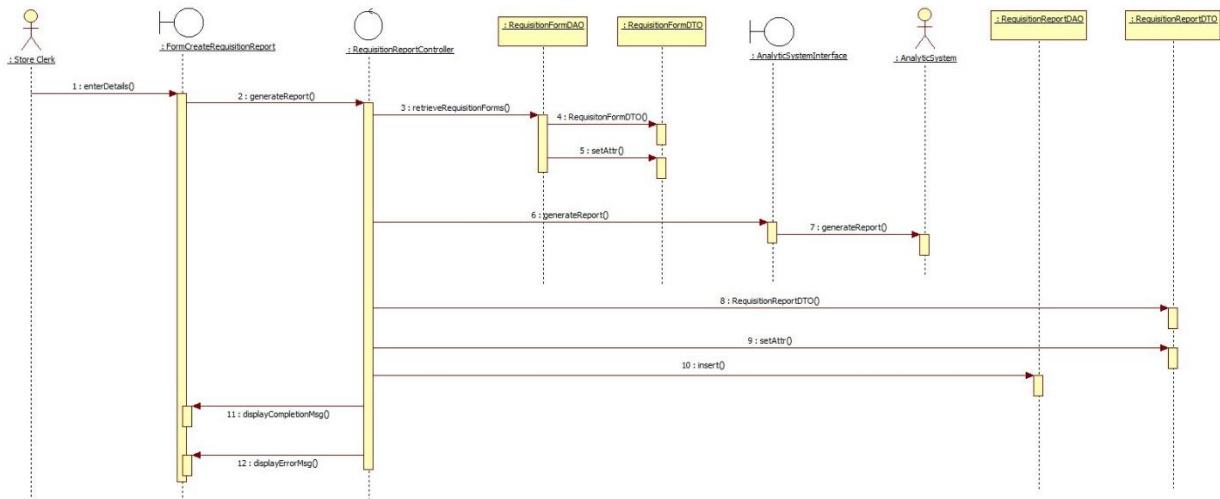
### 2.4.2.1.13 RETRIEVE DISBURSEMENT LIST



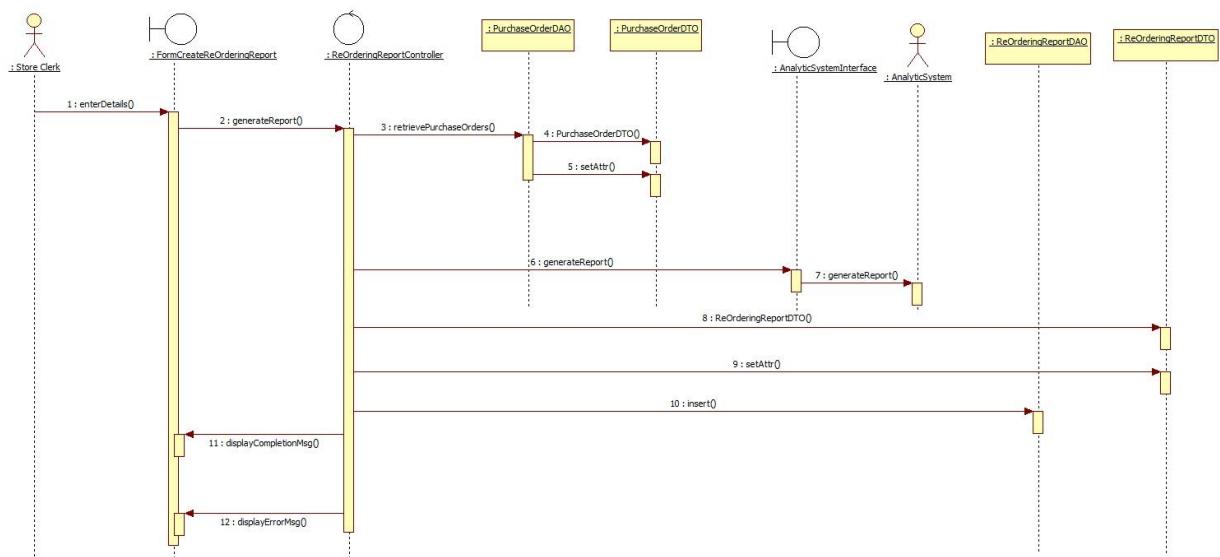
### 2.4.2.1.14 UPDATE INVENTORY



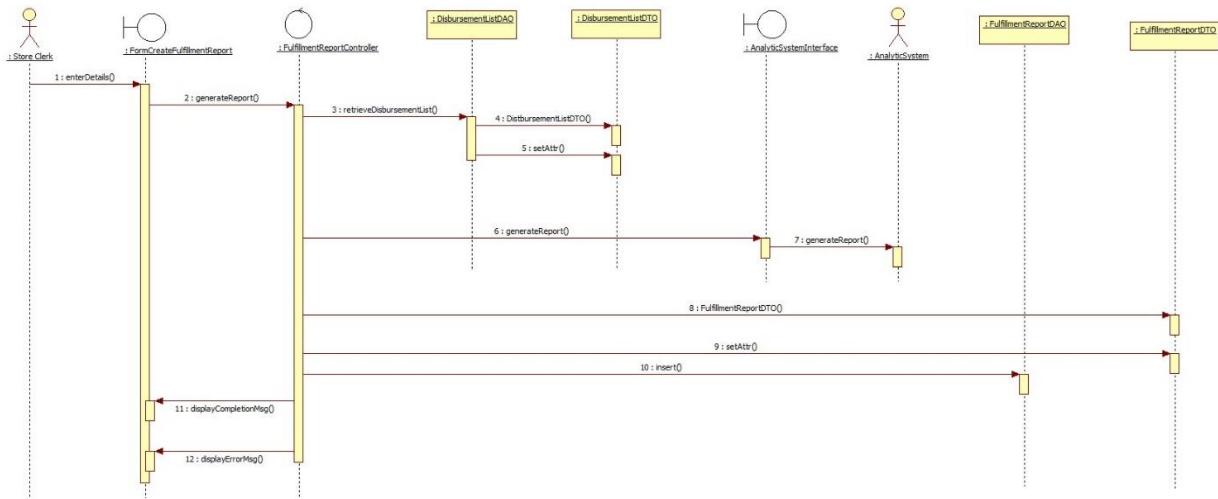
### 2.4.2.1.15 CREATE REQUISITION REPORT



### 2.4.2.1.16 CREATE RE-ORDERING REPORT

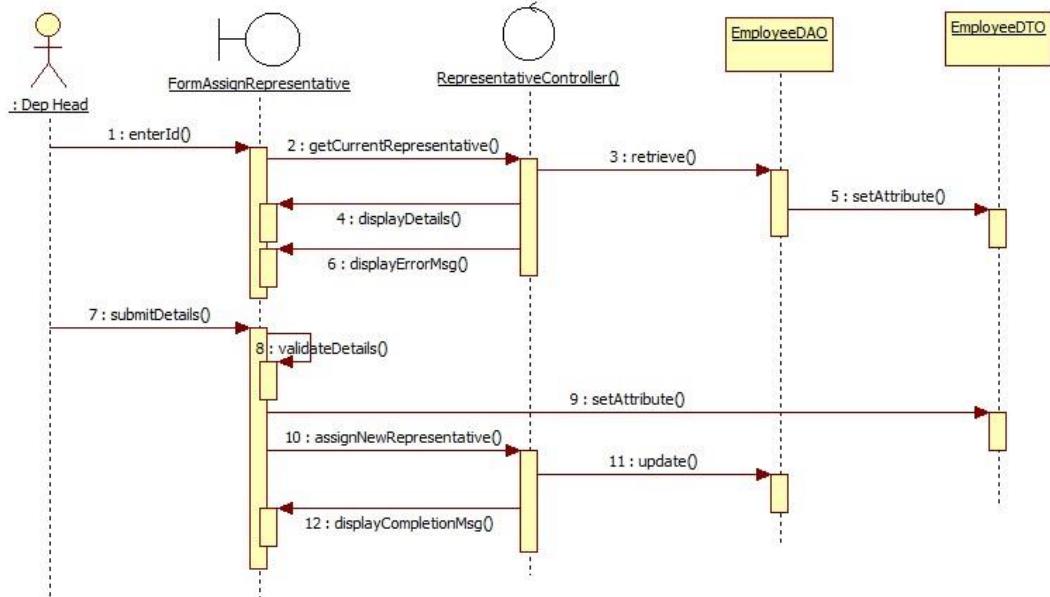


### 2.4.2.1.17 CREATE FULFILMENT REPORT

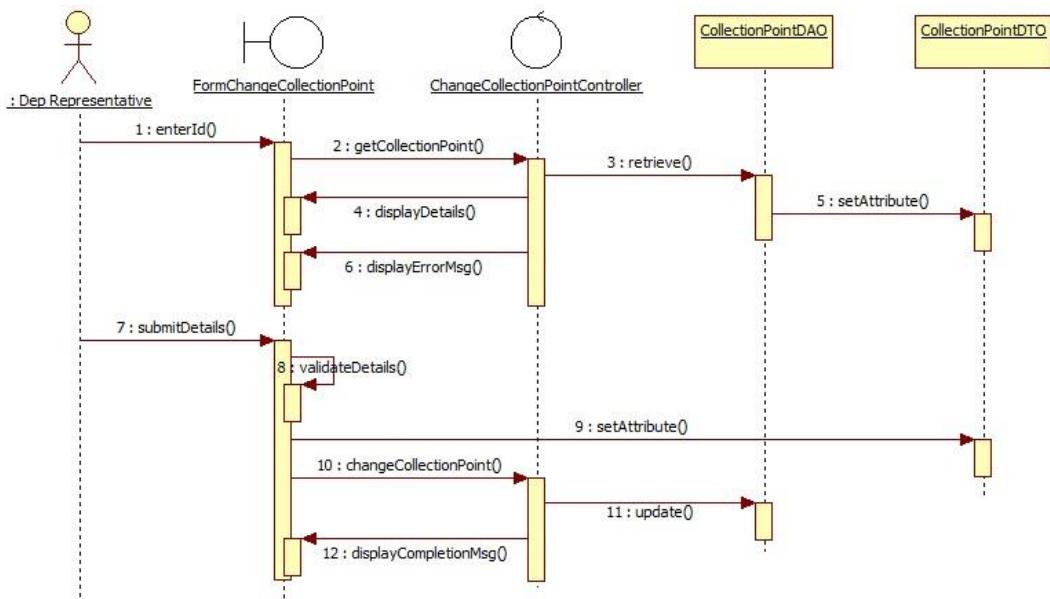


## 2.4.2.2 DEPARTMENT SEQUENCE DIAGRAMS

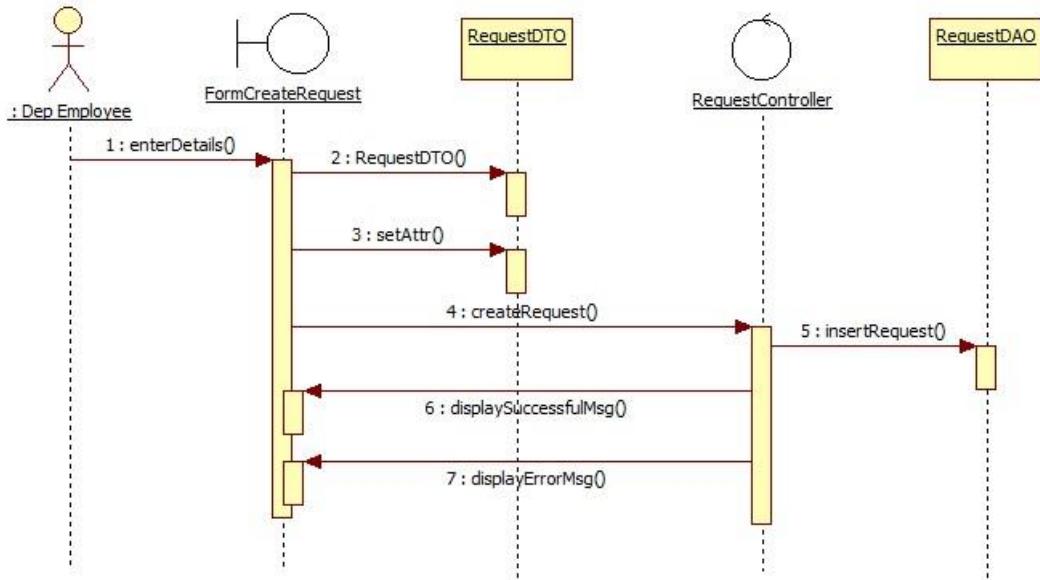
### 2.4.2.2.1 ASSIGN REPRESENTATIVE SEQUENCE DIAGRAM



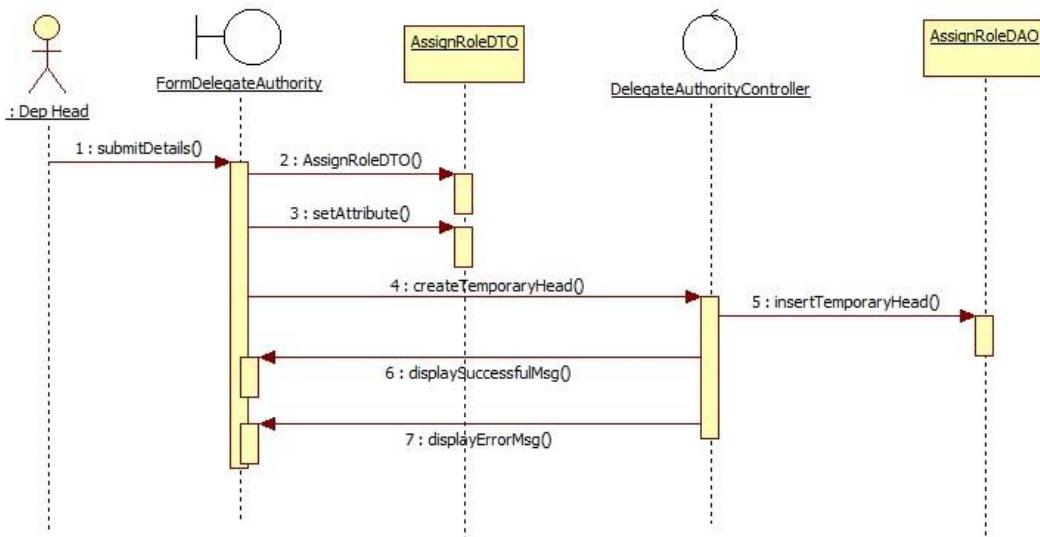
### 2.4.2.2.2 CHANGE COLLECTION POINT SEQUENCE DIAGRAM



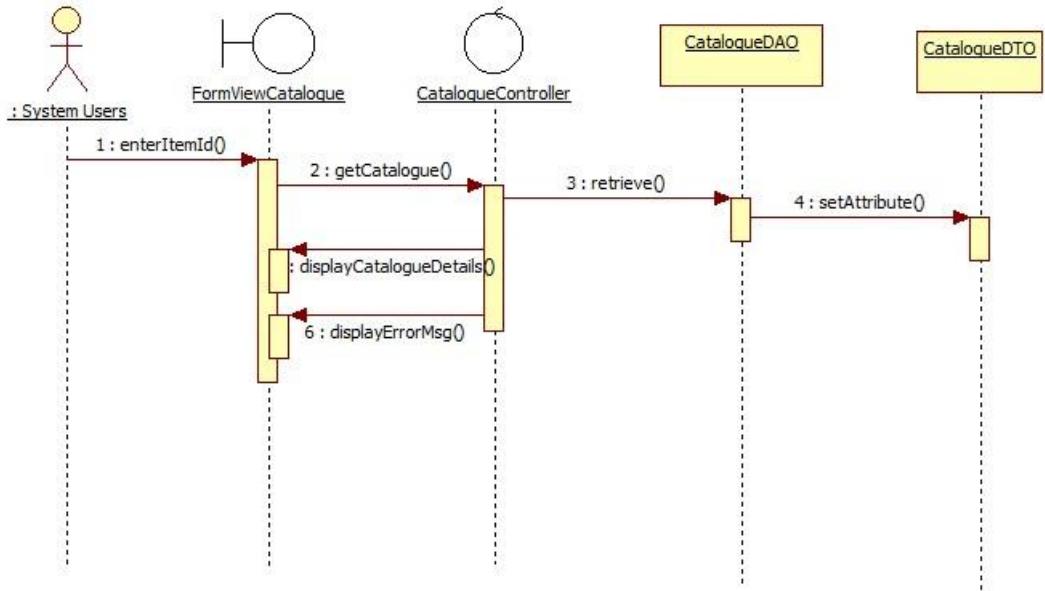
### 2.4.2.2.3 CREATE REQUEST SEQUENCE DIAGRAM



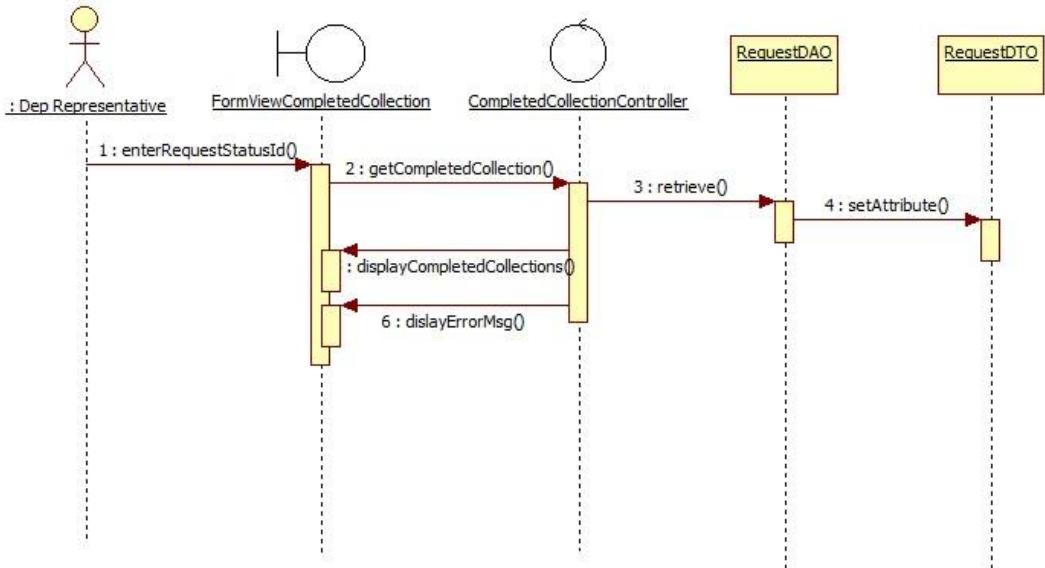
### 2.4.2.2.4 DELEGATE AUTHORITY SEQUENCE DIAGRAM



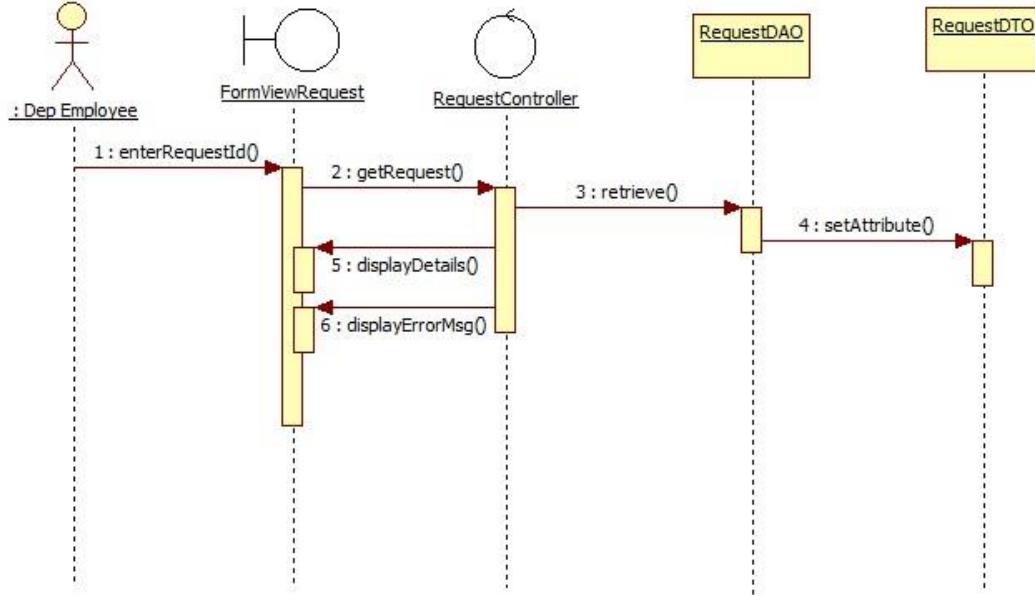
#### 2.4.2.2.5 VIEW CATALOGUE SEQUENCE DIAGRAM



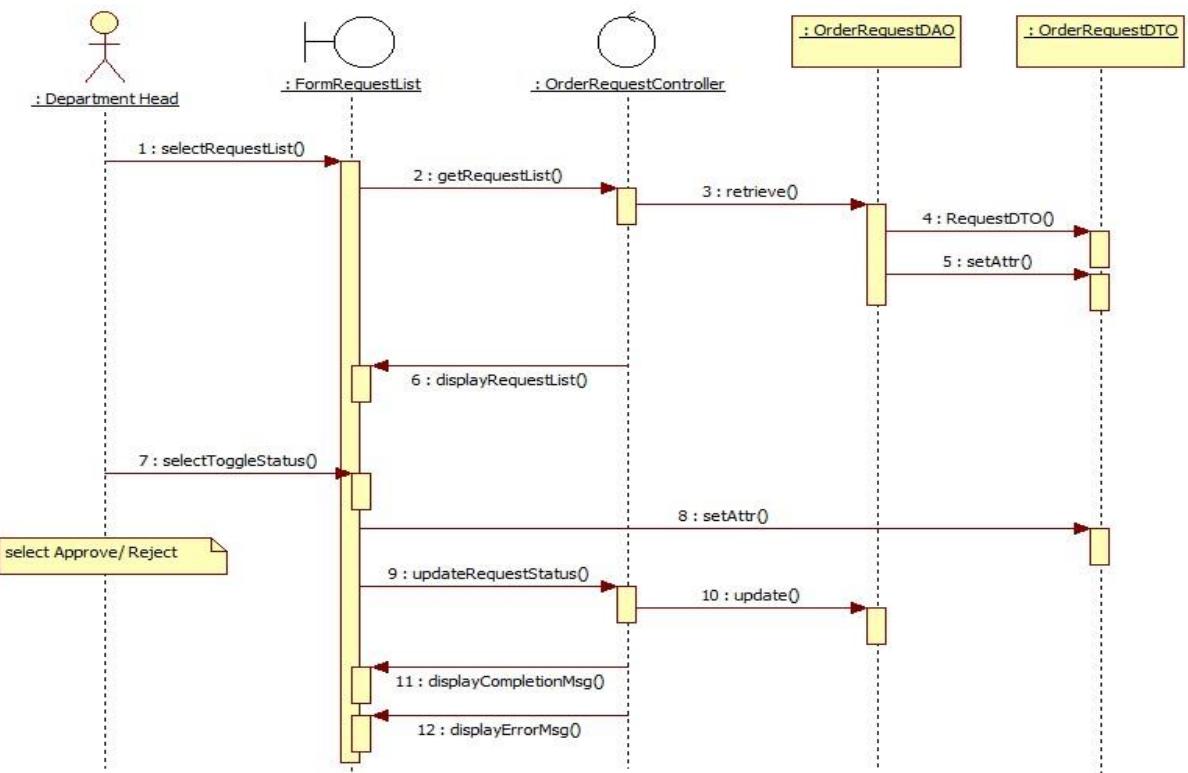
#### 2.4.2.2.6 VIEW COMPLETED SEQUENCE DIAGRAM



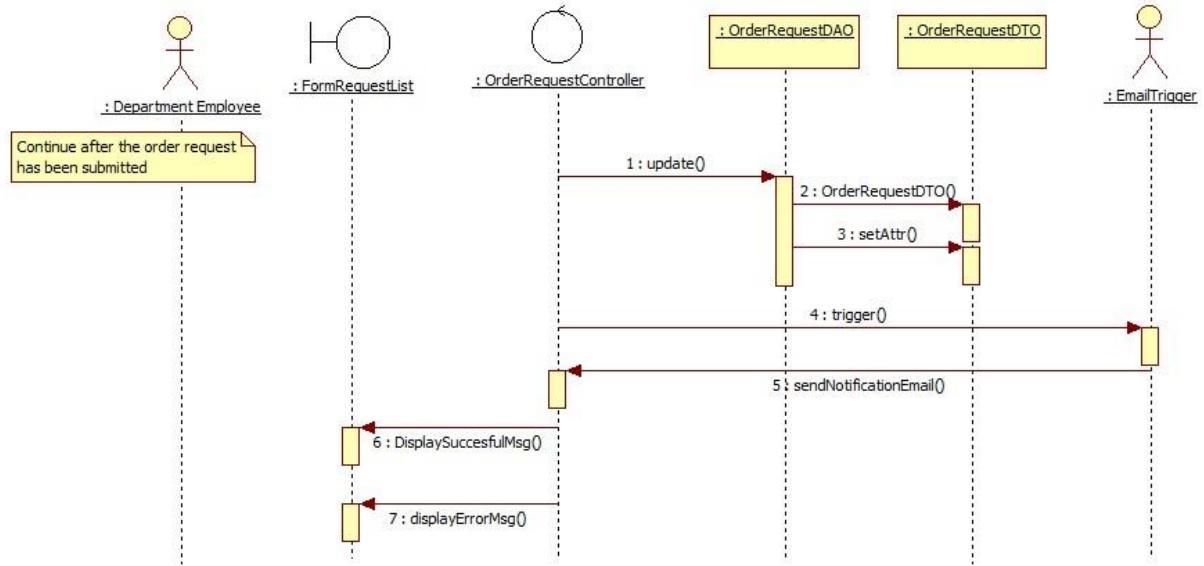
### 2.4.2.2.7 VIEW REQUESTS



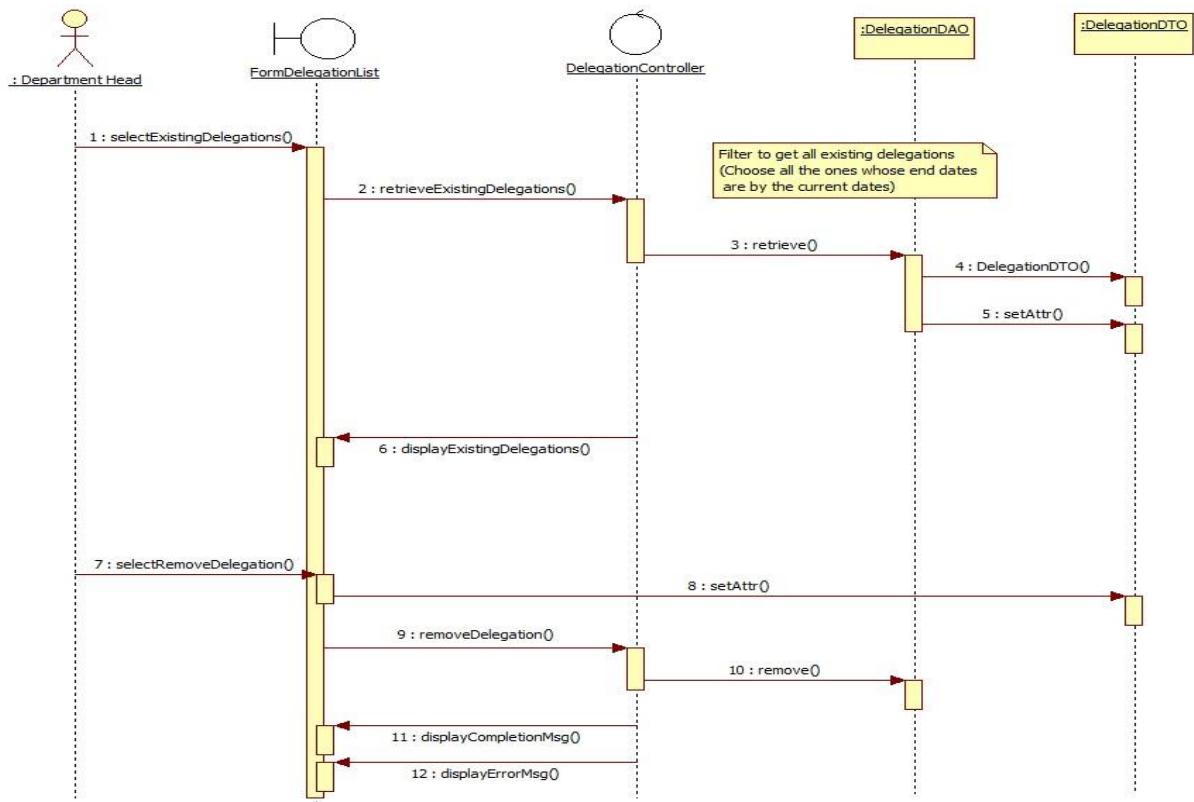
### 2.4.2.2.8 APPROVE/ REJECT ORDER REQUESTS



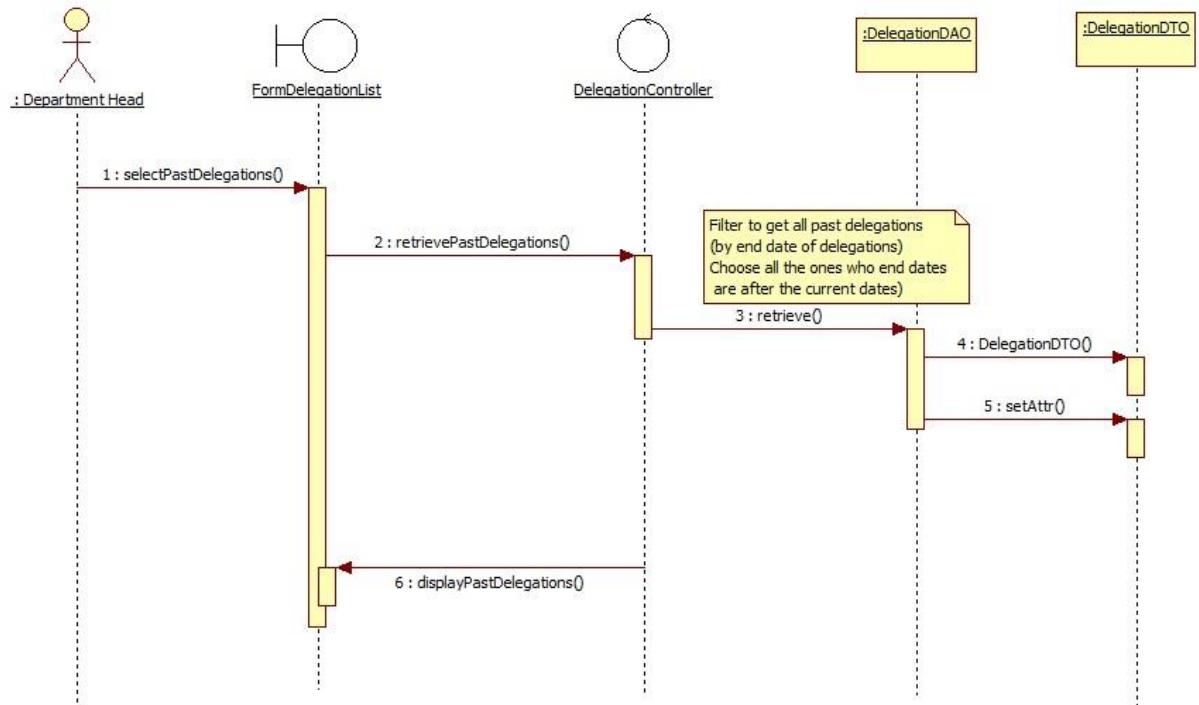
### 2.4.2.2.9 EMAIL NOTIFICATIONS



### 2.4.2.2.10 VIEW/ CANCEL EXISTING DELEGATIONS



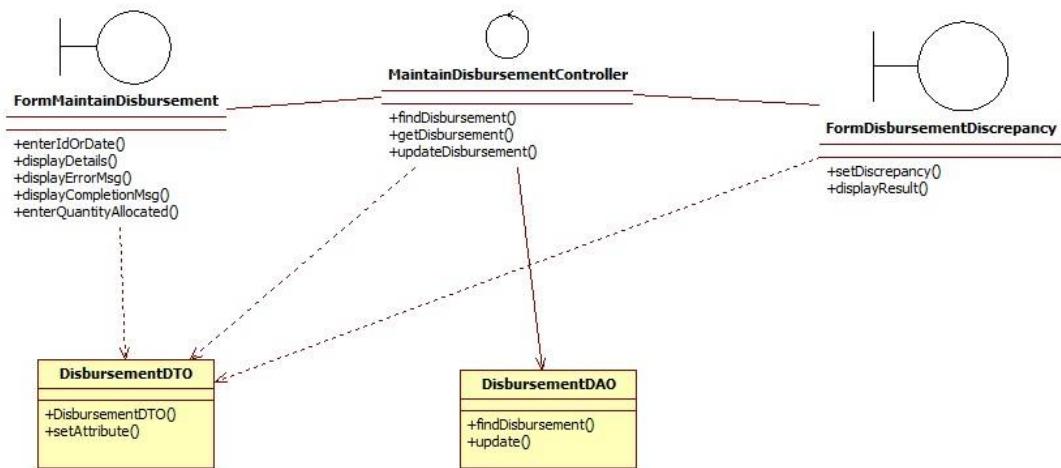
### 2.4.2.2.11 VIEW PAST DELEGATIONS



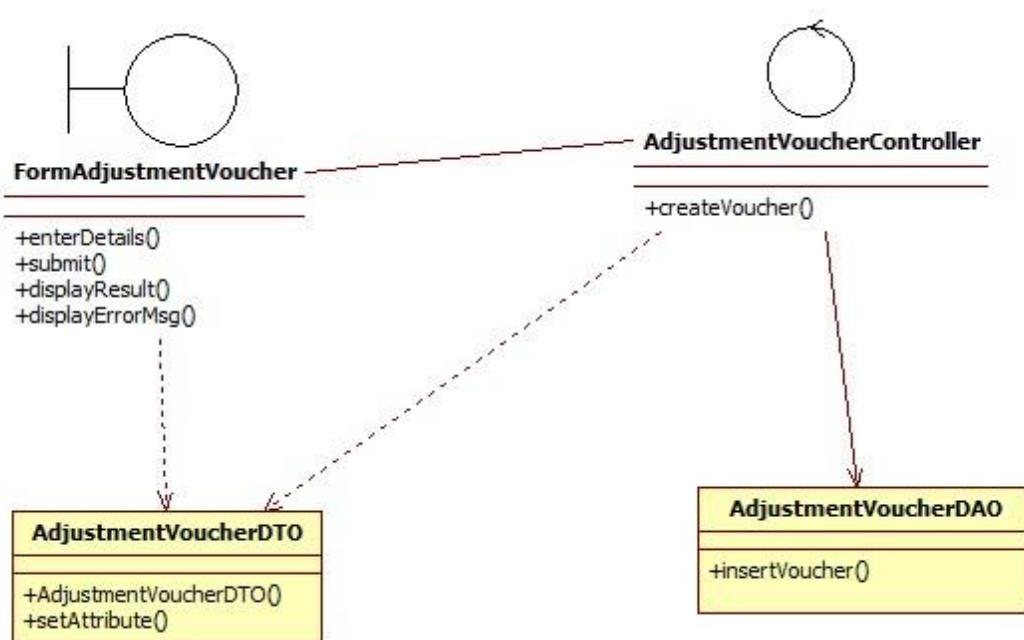
## 2.4.3 DESIGN CLASS DIAGRAM

### 2.4.3.1 STORE CLASS DIAGRAMS

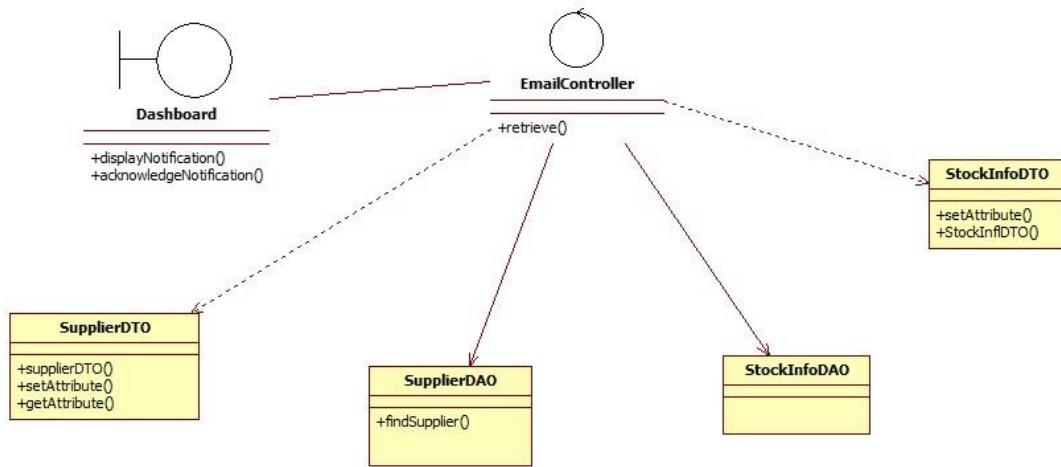
#### 2.4.3.1.1 MAINTAIN DISBURSEMENT



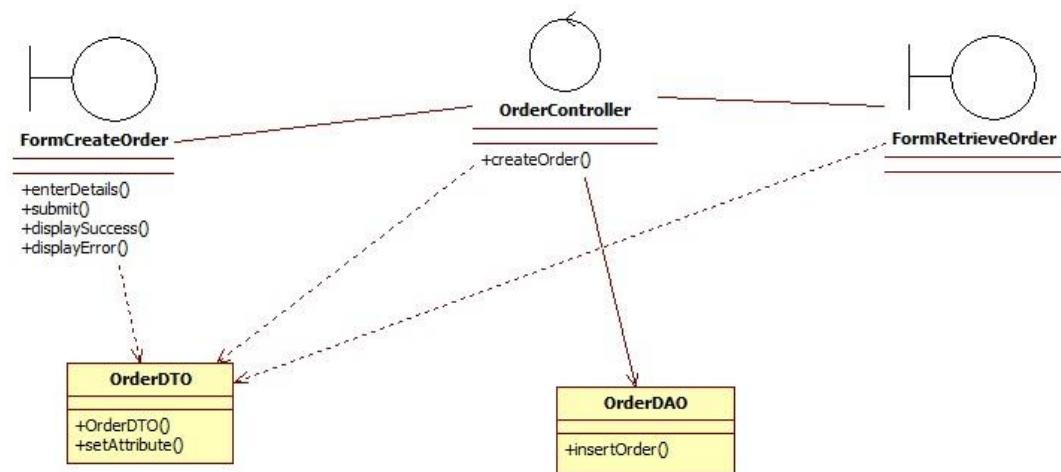
#### 2.4.3.1.2 SHOW ADJUSTMENT VOUCHER



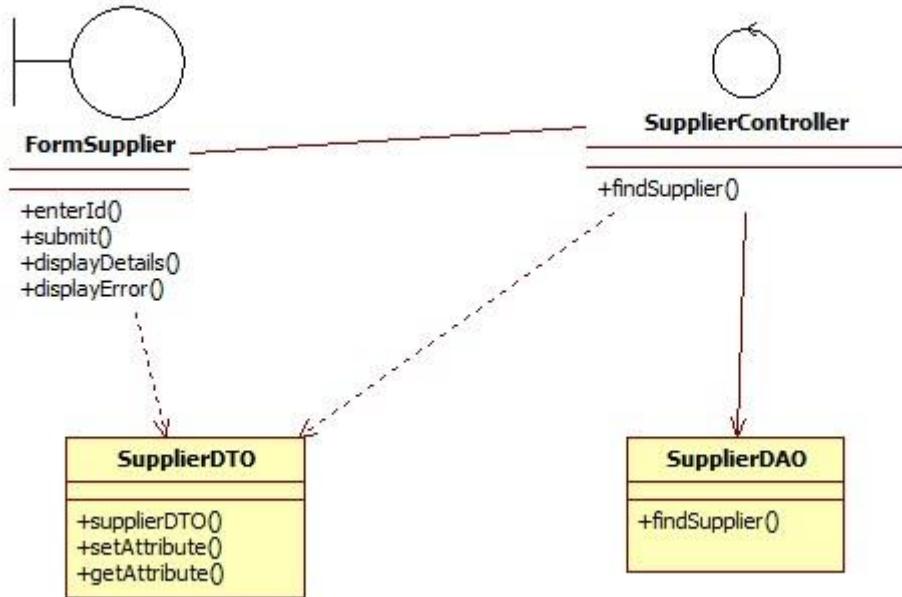
### 2.4.3.1.3 EMAIL NOTIFICATIONS ABOUT INVENTORY



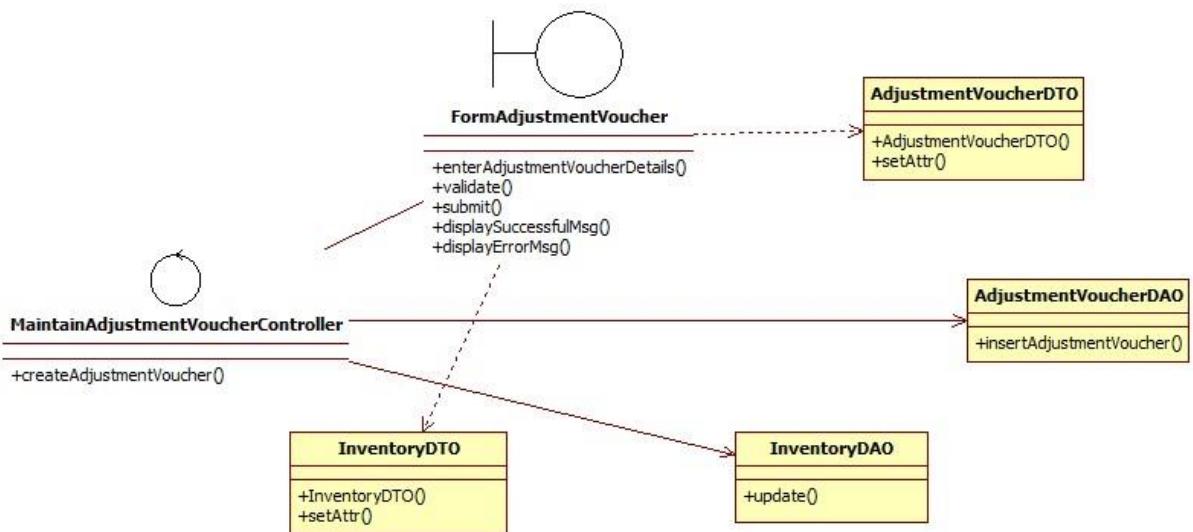
### 2.4.3.1.4 CREATE AND RETRIEVE ORDERS



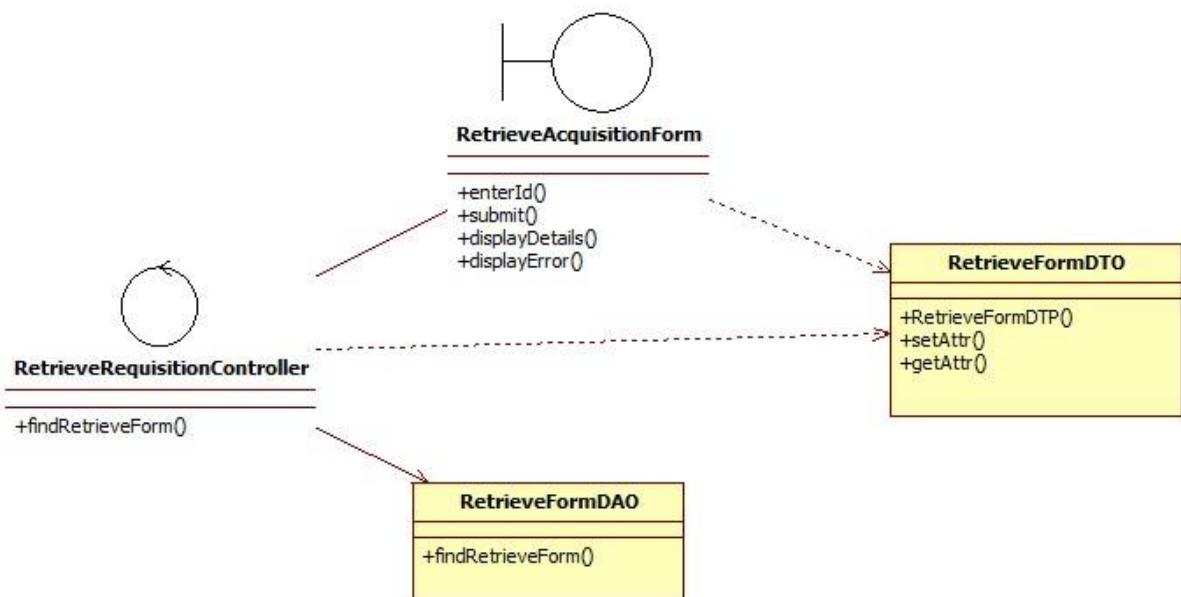
### **2.4.3.1.5 RETRIEVE SUPPLIERS**



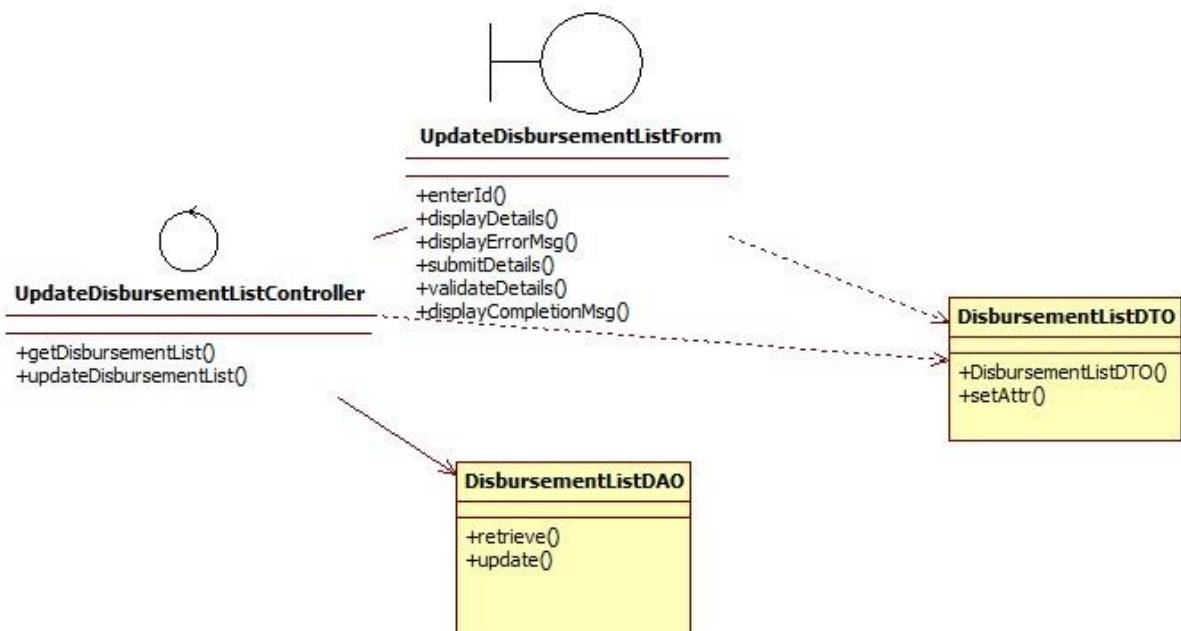
#### **2.4.3.1.6 RAISE ADJUSTMENT VOUCHER**



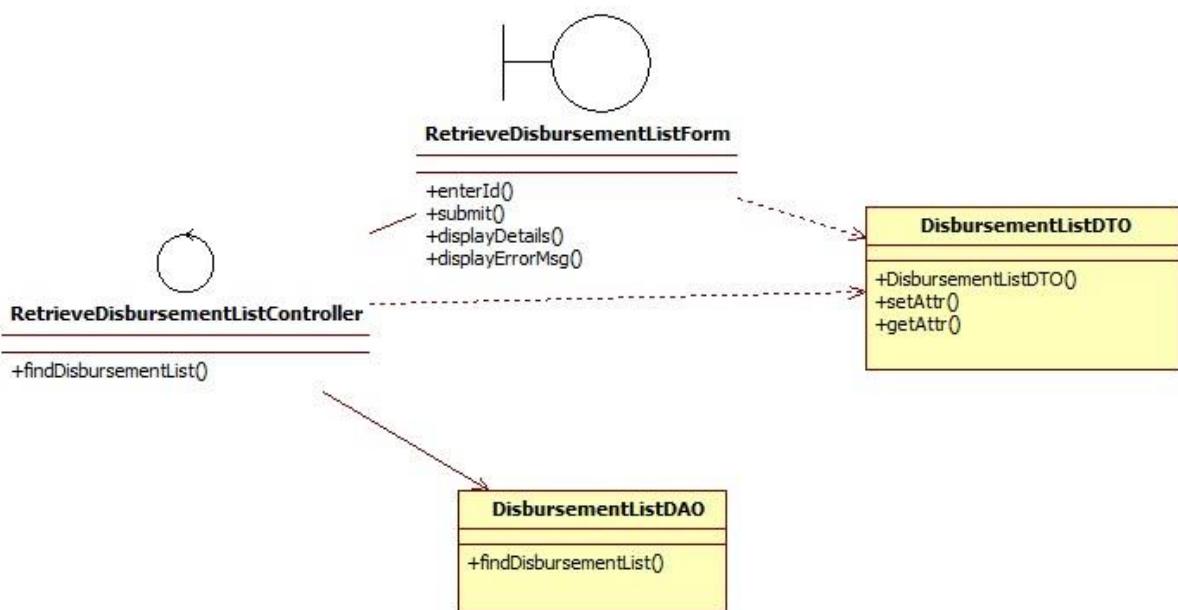
#### 2.4.3.1.7 RETRIEVE REQUISITION FORM



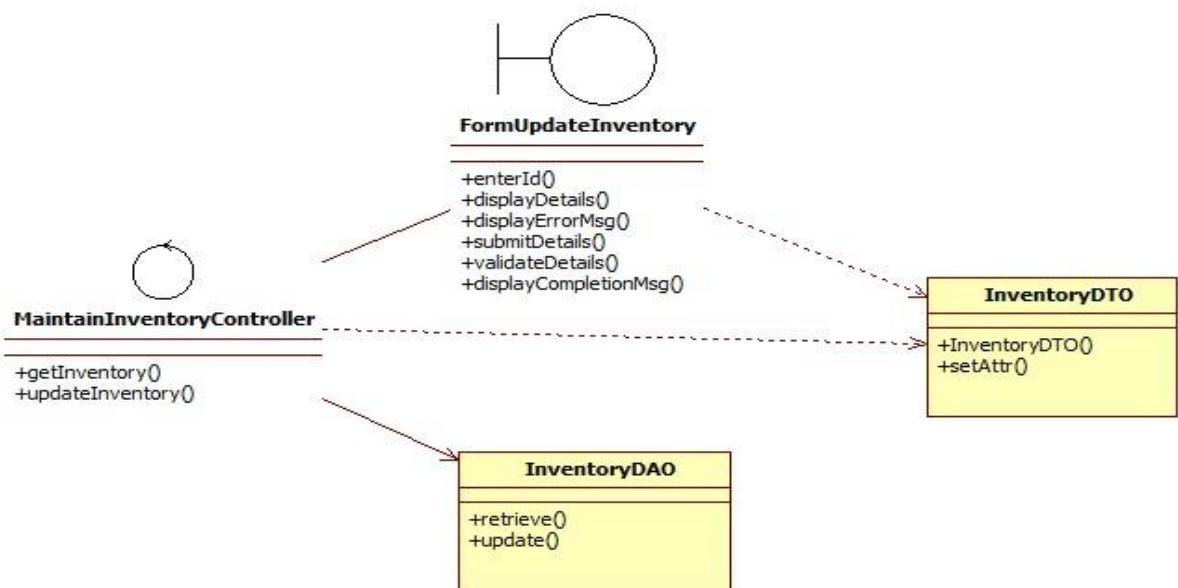
#### 2.4.3.1.8 UPDATE DISBURSEMENT LIST



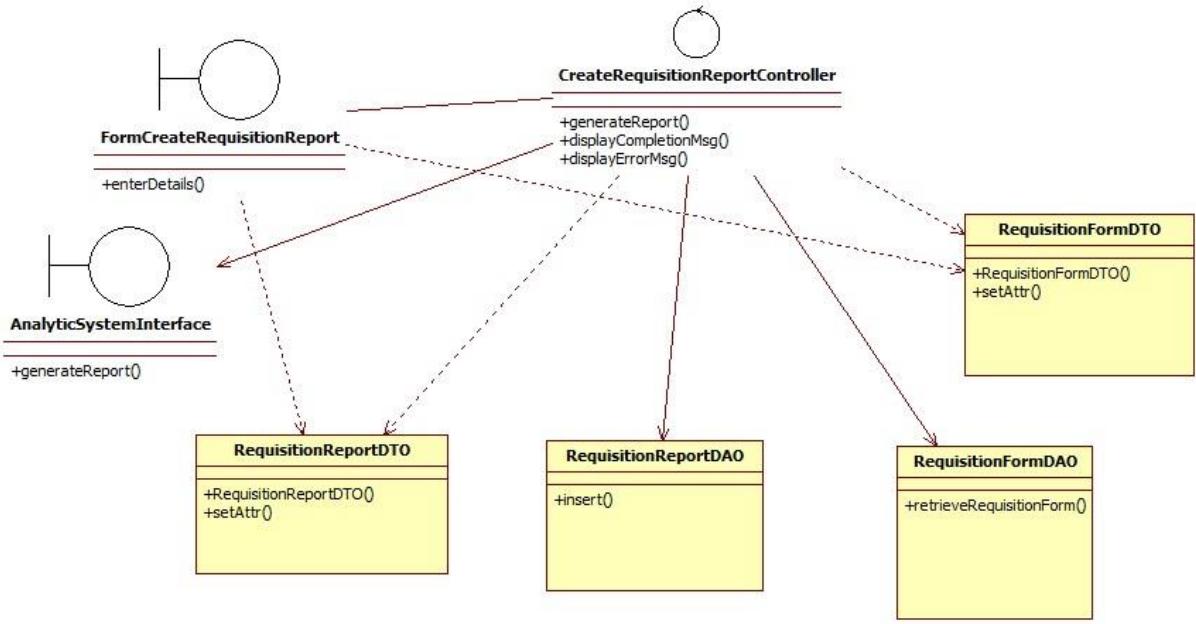
#### 2.4.3.1.9 RETRIEVE DISBURSEMENT LIST



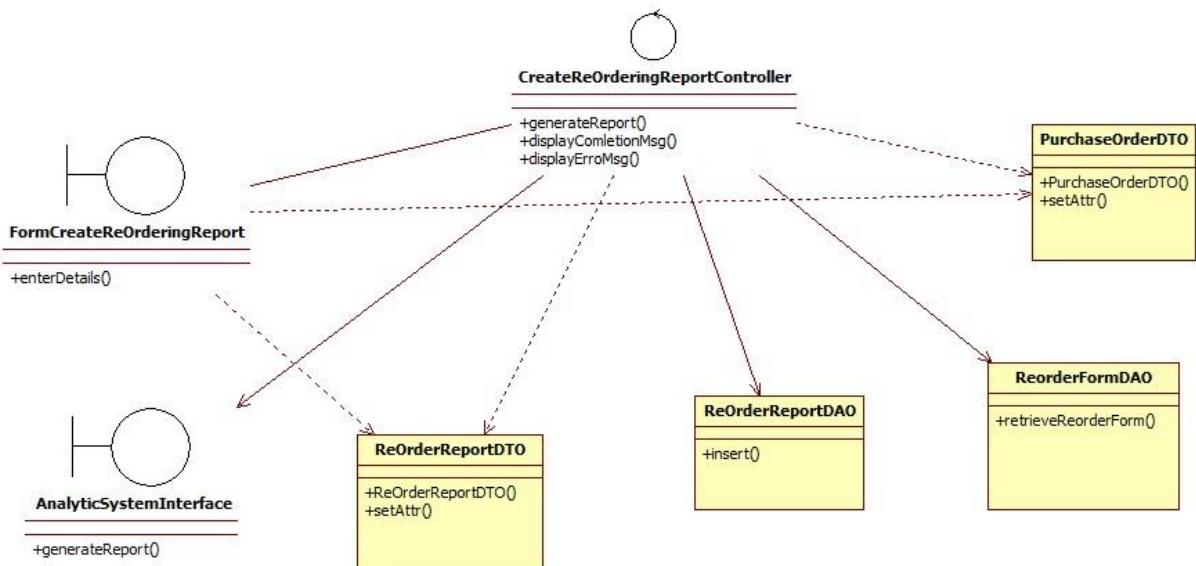
#### 2.4.3.1.10 UPDATE INVENTORY



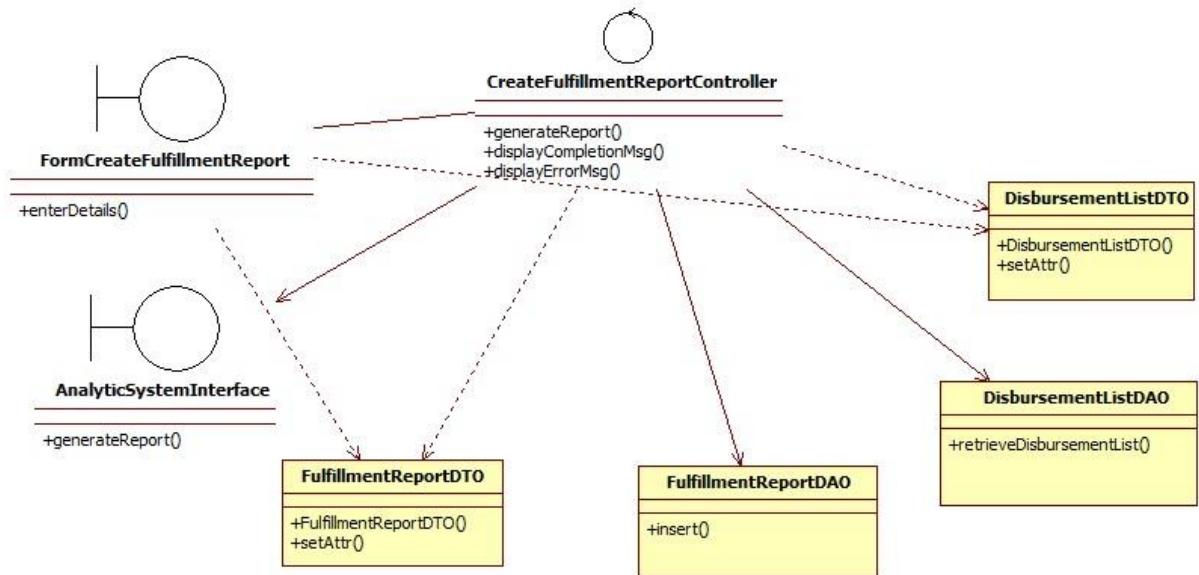
### 2.4.3.1.11 CREATE REQUISITION REPORT



### 2.4.3.1.12 CREATE RE-ORDERING REPORT

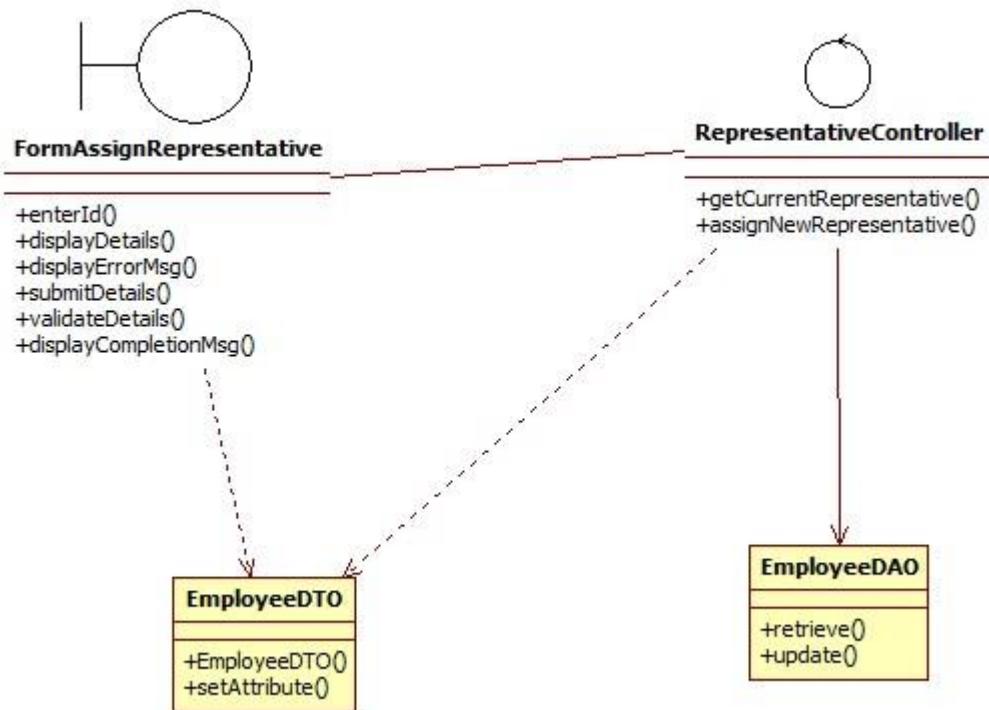


### 2.4.3.1.13 CREATE FULFILLMENT REPORT

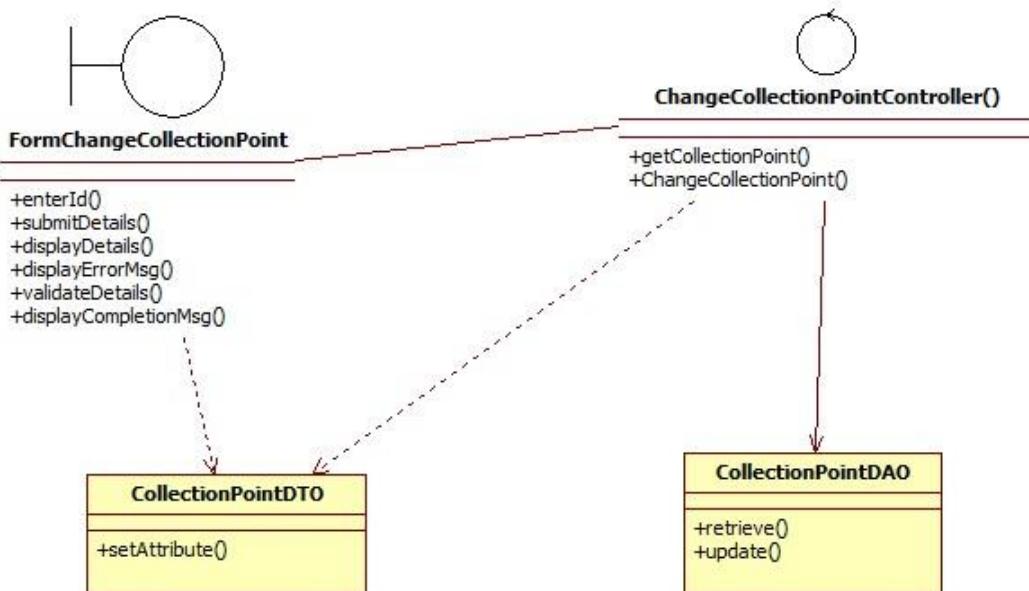


## 2.4.3.2 DEPARTMENT CLASS DIAGRAMS

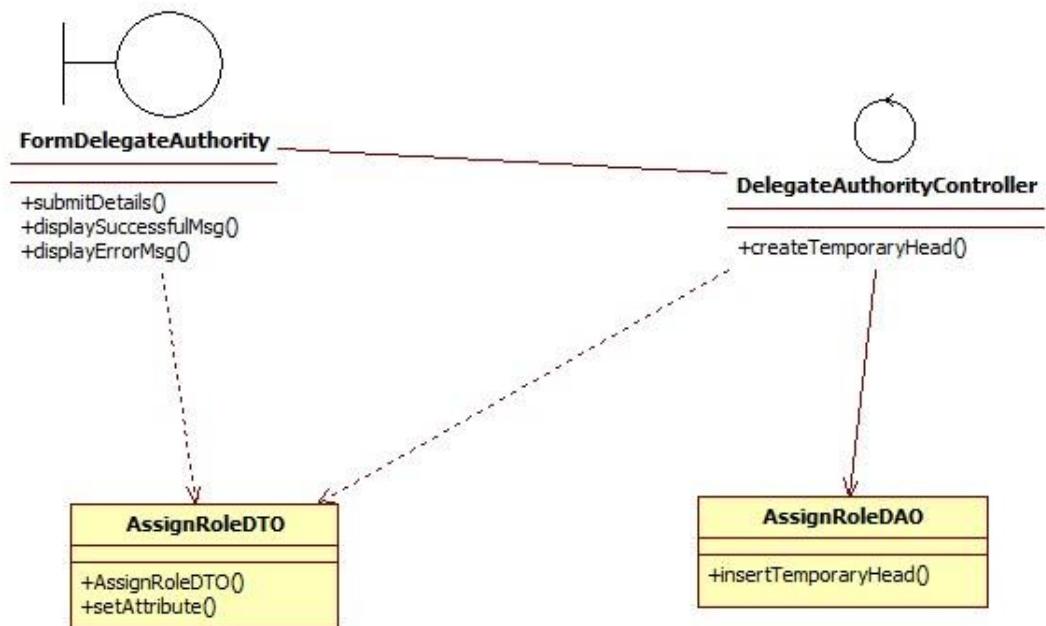
### 2.4.3.2.1 ASSIGN REPRESENTATIVE



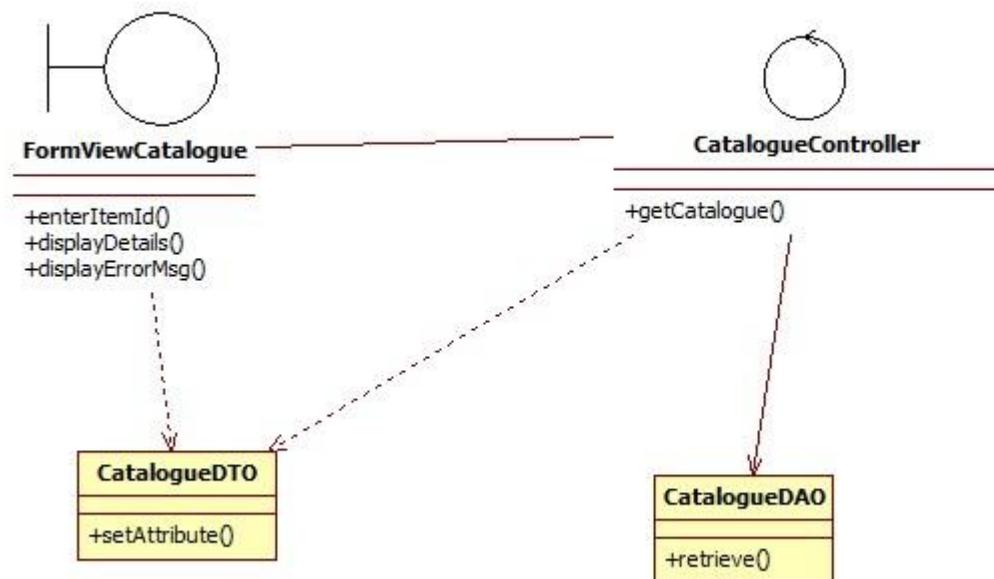
### 2.4.3.2.2 CHANGE COLLECTION POINT



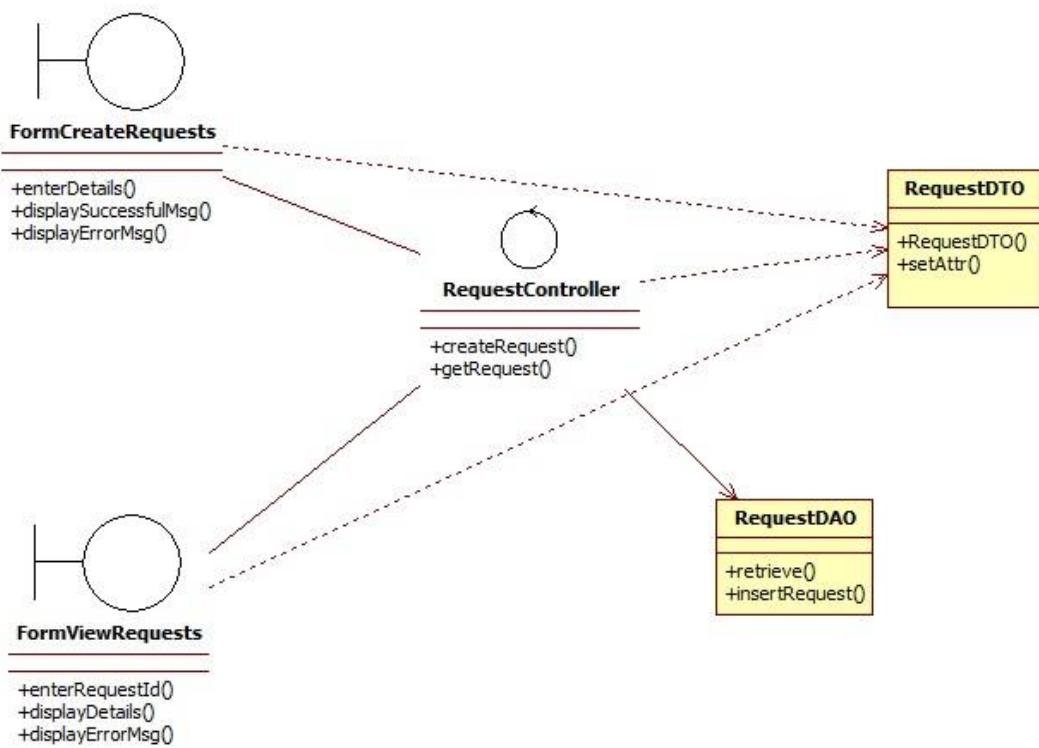
#### 2.4.3.2.3 DELEGATE AUTHORITY



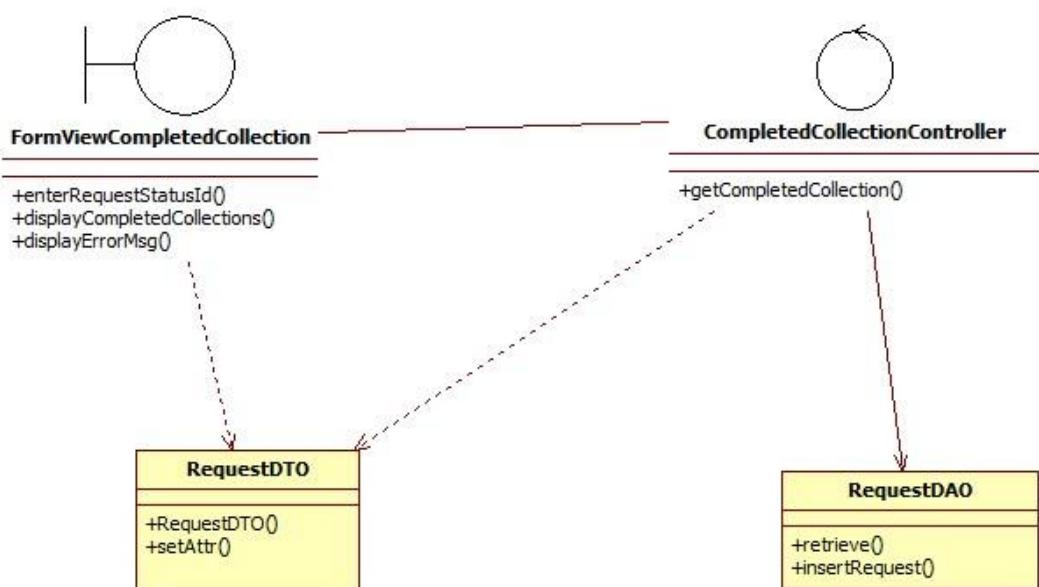
#### 2.4.3.2.4 VIEW CATALOGUE



### 2.4.3.2.5 CREATE REQUEST

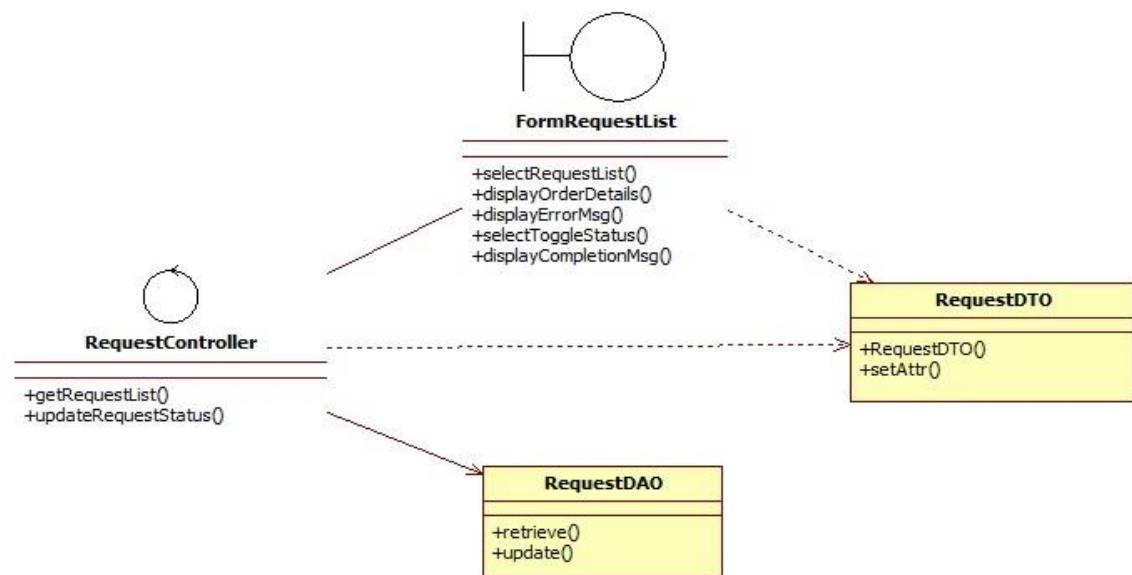


### 2.4.3.2.6 VIEW COMPLETED COLLECTION

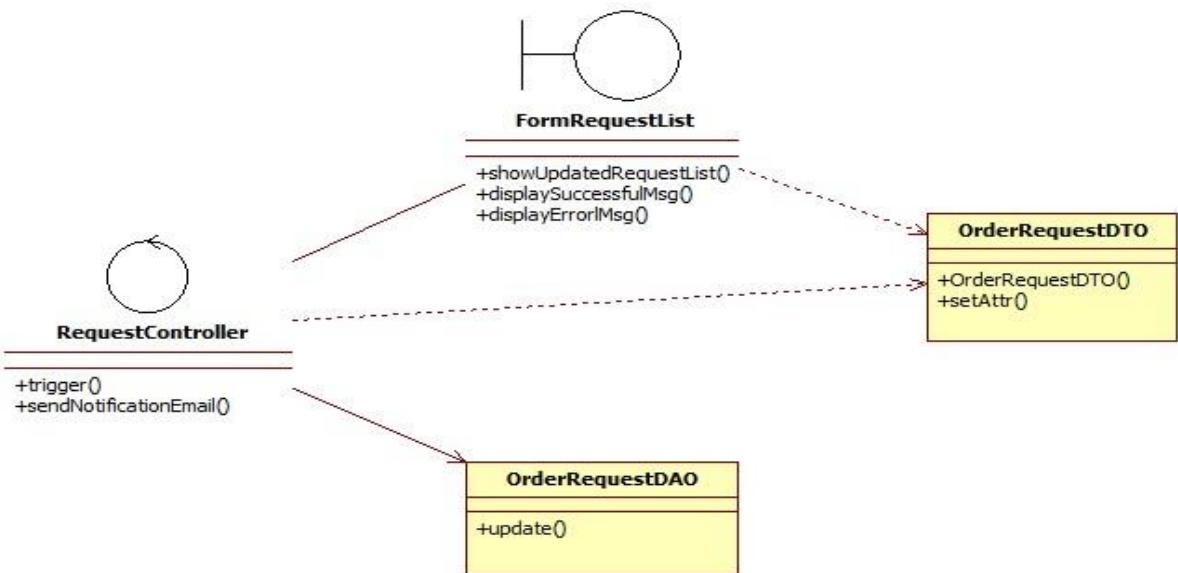


### 2.4.3.2.7 APPROVE/ REJECT ORDER REQUESTS

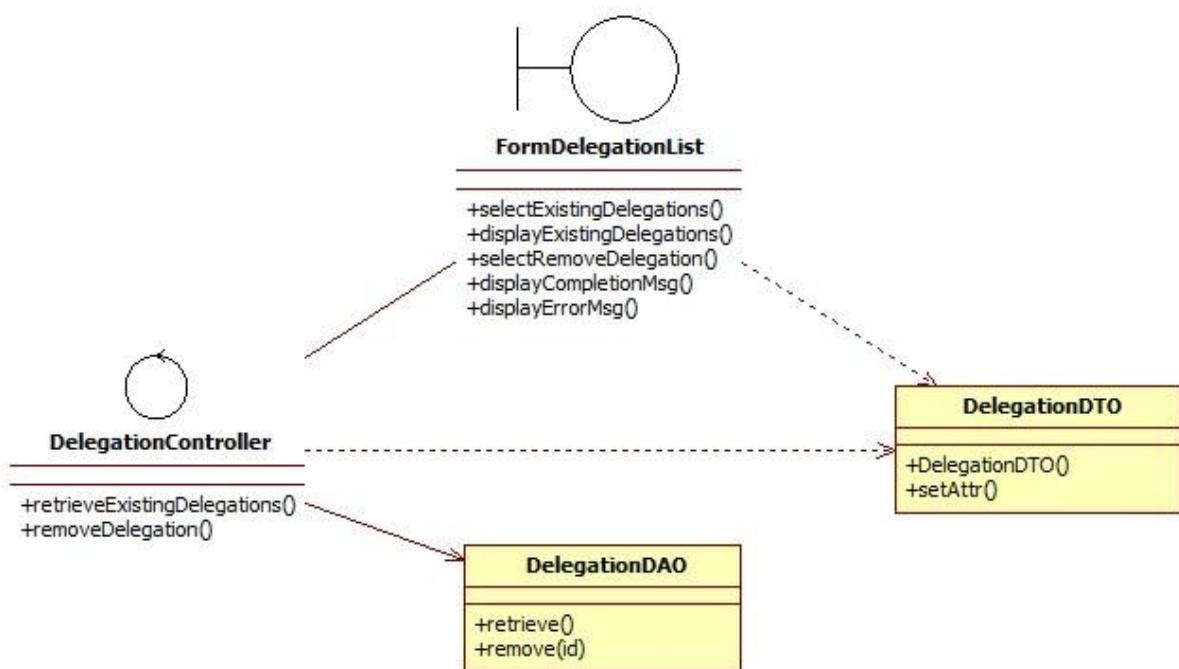
Approve/ Reject Requests



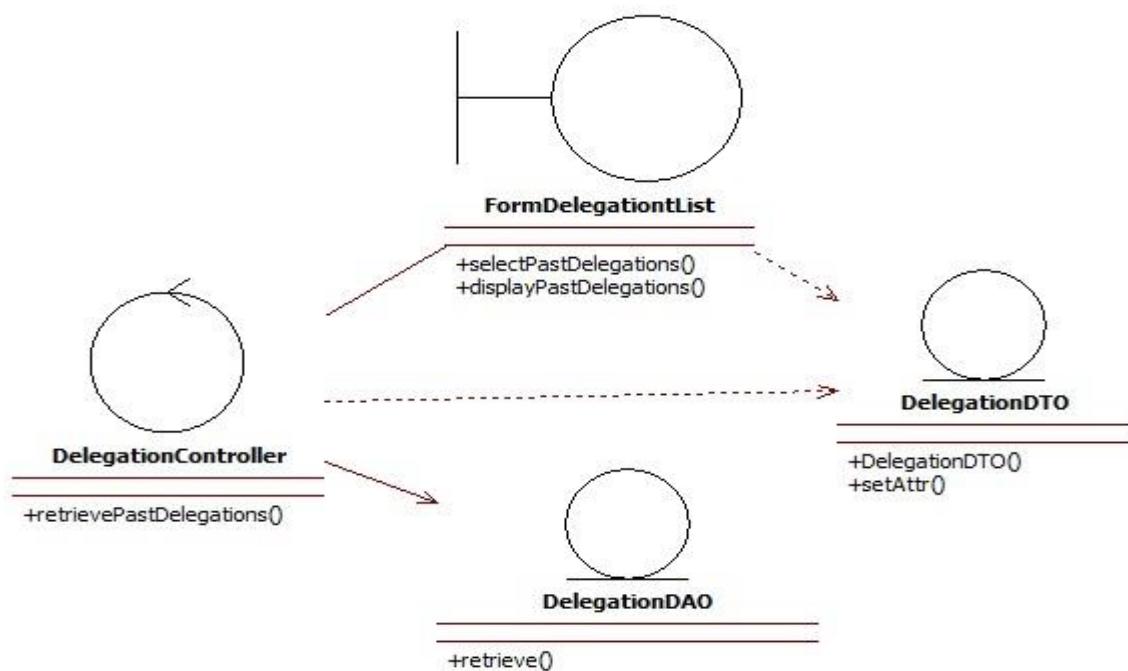
### 2.4.3.2.8 EMAIL NOTIFICATIONS



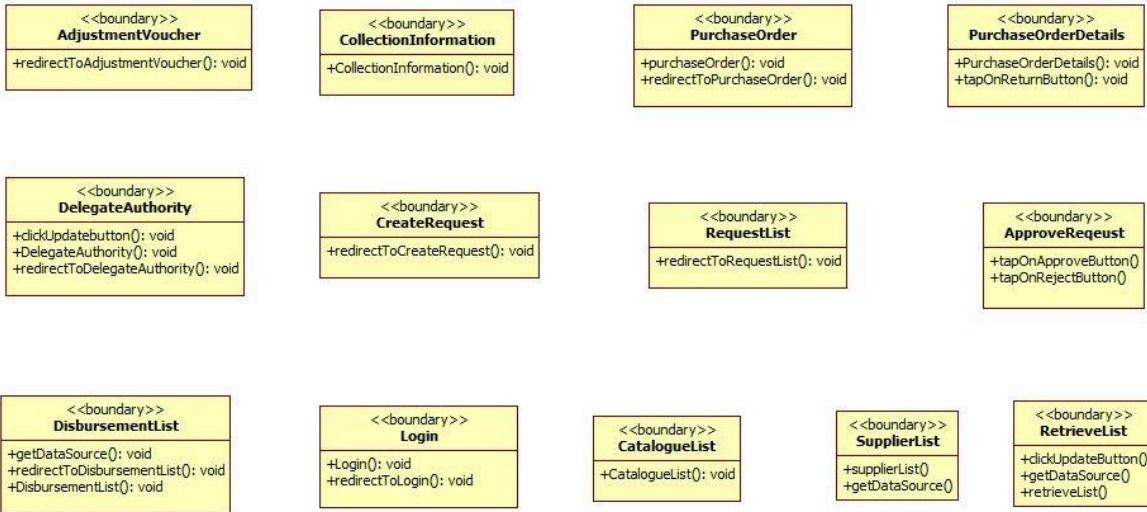
### 2.4.3.2.9 VIEW/ CANCEL EXISTING DELEGATIONS



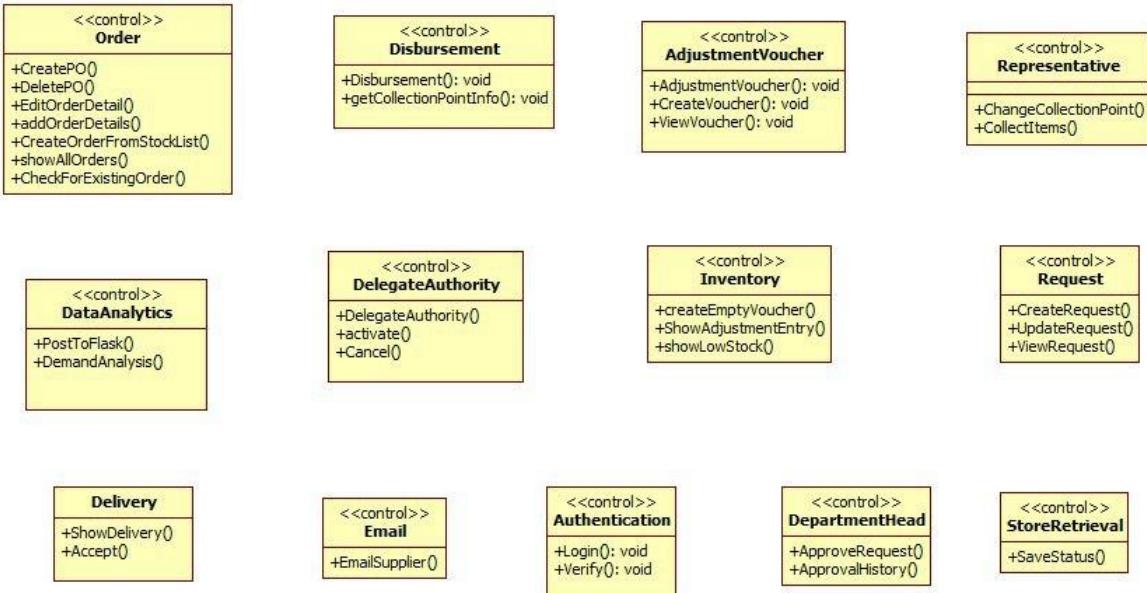
### 2.4.3.2.10 VIEW PAST DELEGATIONS



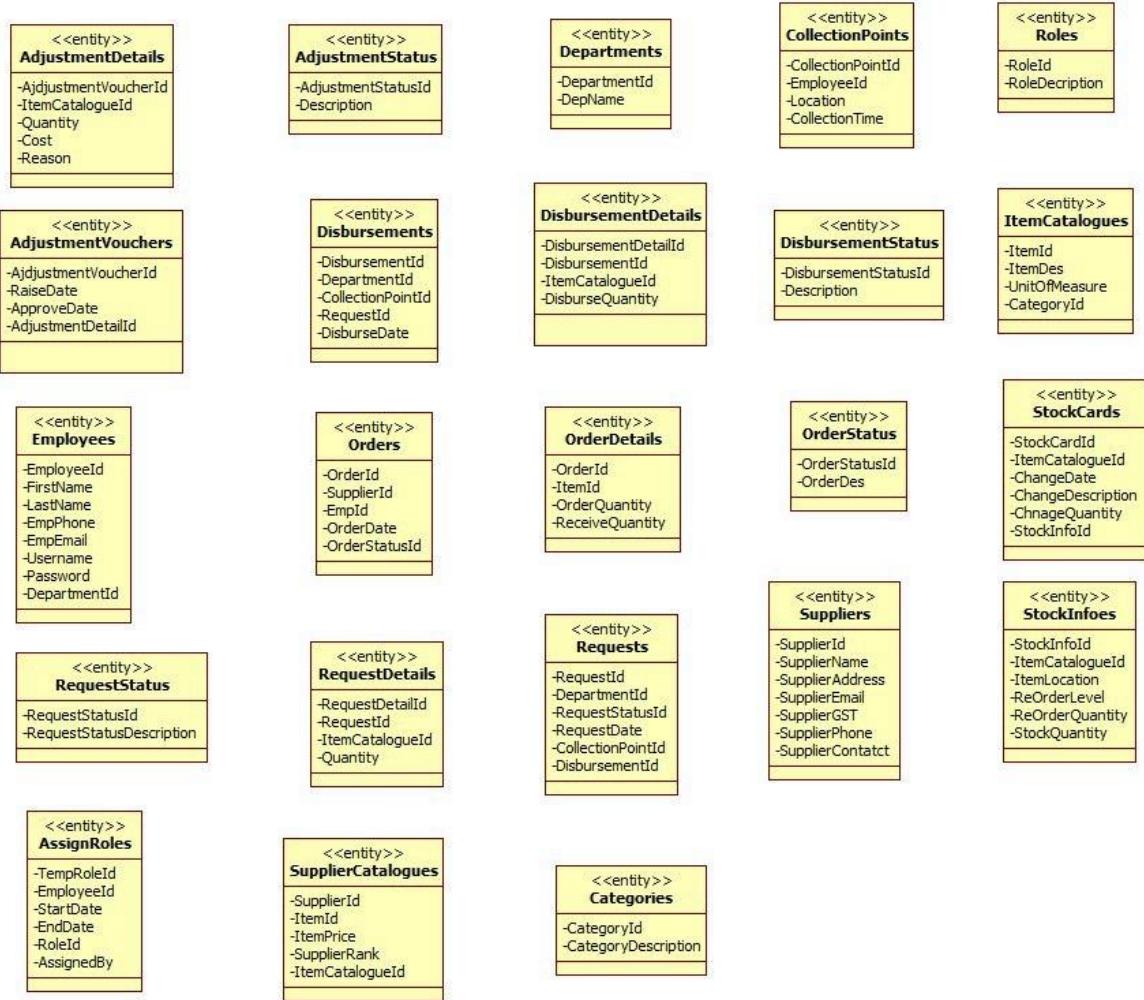
### 2.4.3.3 BOUNDARY CLASS DIAGRAMS



### 2.4.3.4 CONTROL CLASS DIAGRAMS

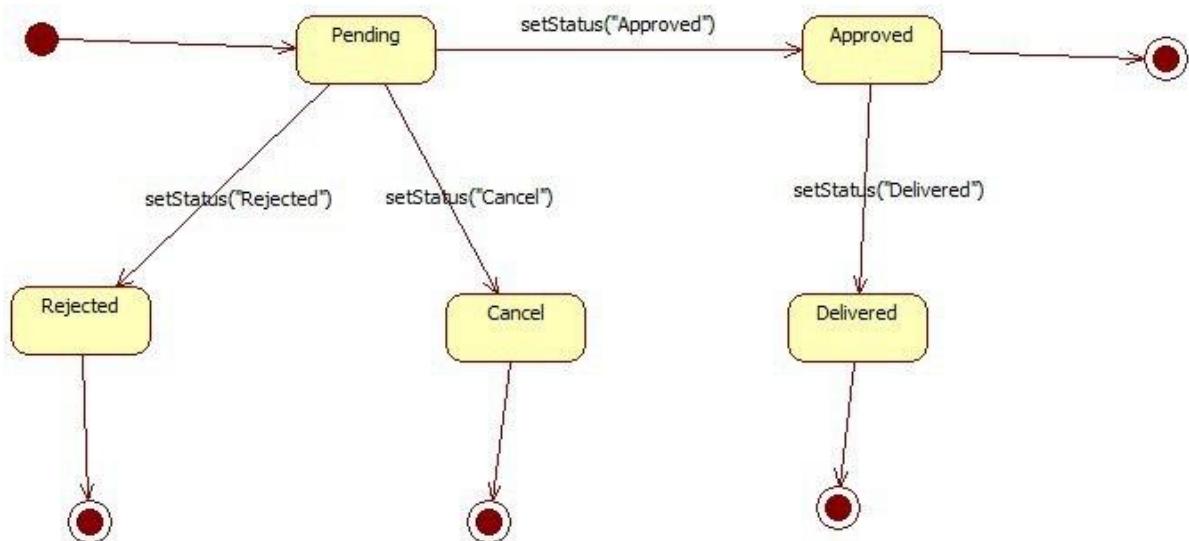


### 2.4.3.5 ENTITY CLASS DIAGRAMS

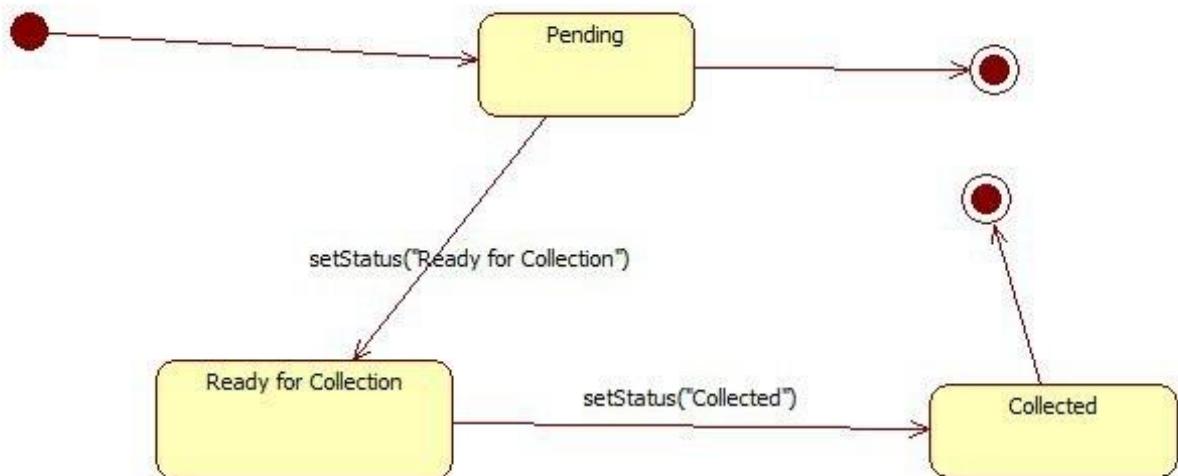


## 2.4.4 STATECHART DIAGRAM

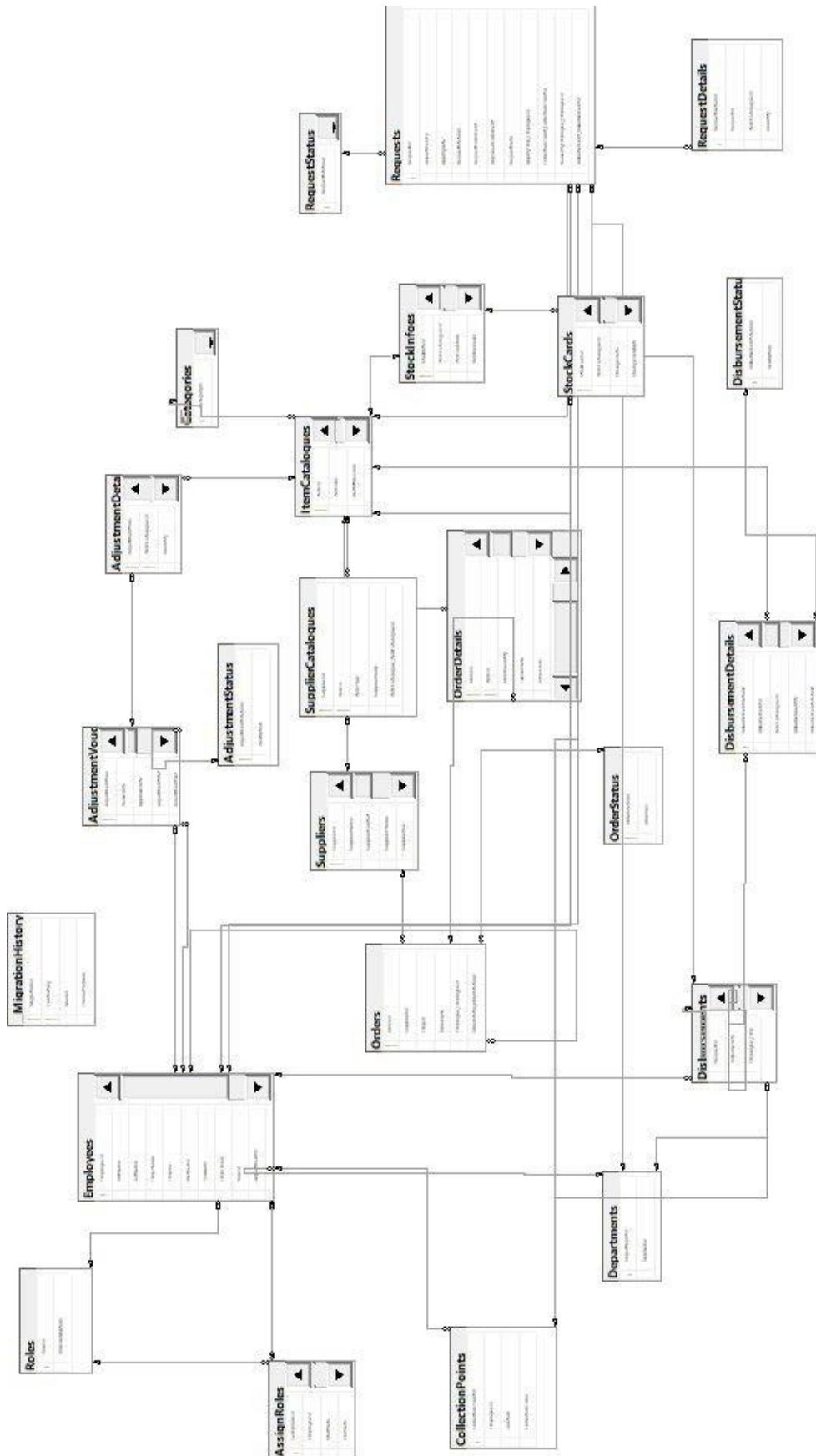
### 2.4.4.1 ORDER STATUS STATECHART DIAGRAM



### 2.4.4.1 DISBURSEMENT STATUS STATECHART DIAGRAM



## 2.4.5 RELATIONAL DATABASE DESIGN



## 2.5 FUNCTIONAL TESTING FOR USE CASE

### 2.5.1 OVERVIEW TESTING CHECKLIST

Part	ScreenName	Bugs (function)	Responsive /Layout	Pagination
Department Head	DepartmentHead_WelcomePage	ok	ok	-
	ApproveRequest	ok	ok	ok
	ApprovalHistory	ok	ok	ok
	DelegateAuthority	ok	ok	-
	DelegateAuthorityEdit	ok	ok	-
Department Rep	RepresentativeWelcomePage	ok	ok	-
	Representative/Index	ok	ok	-
	CollectRequestedItems	ok	ok	-
Department Emp	DepartmentEmployee_WelcomePage	ok	ok	-
	Request/Index	ok	ok	ok
	Request/Create	ok	ok	-
StoreClerk	StoreClerk_WelcomePage	ok	ok	-
	StoreRetrieval/Index	ok	ok	-
	Disbursement/Index	ok	ok	ok
	Disbursement/Edit	ok	ok	-
	InventoryList	ok	ok	ok
	Inventory>ShowAdjustmentEntry	ok	ok	-
	DataAnalytics/Analytic Page (Long Term)	ok	ok	-
	DataAnalytics/Index (Short Term)	ok	ok	-
	Order/showAllOrders	ok	ok	-
	Order/ViewPO	ok	ok	-
	Delivery>ShowDelivery	ok	ok	-
	AdjustmentVoucher/ViewAllVouchers	ok	ok	ok
	AdjustmentVoucher/ViewVoucher	ok	ok	-
	AdjustmentVoucher/CreateVoucher	ok	ok	-

### 2.5.1 TEST SCRIPT

<b>Test Type: Functional Testing</b>			
<b>Prepared by: Samuel Yeo</b>		<b>Tested by: Samuel Yeo</b>	
<b>Test Description</b> Test purpose is to ensure: <ul style="list-style-type: none"> <li>• Access rights for the 4 account type (Store clerk, Dept rep, Dept employee, Dept head)</li> <li>• Navigation through all CRUD features and function</li> </ul>		<b>Program tested</b> Login CRUD(Department and Store) Functional Validation  <b>3 random use cases selected for store and for department</b> <b>Store clerk – Retrieve Orders</b> <b>Store clerk – Update Disbursement List</b> <b>Store clerk – Raise Adjustment Voucher (simulated stocktake)</b> <b>Dep employee – Create Request</b> <b>Dep head – Delegate Authority</b> <b>Dep representative – Change Collection Point</b>	
S/N	Test step	Expected result	Actual result
1	Login page URL:  Login validation: <ol style="list-style-type: none"> <li>1. Enter “username” into username field</li> <li>2. Enter “password” into password field</li> <li>3. click on “Login” button</li> </ol>	Alert message “username or password is incorrect”	Pass
	Login validation (Empty username field) <ol style="list-style-type: none"> <li>1. Enter “password” into password field</li> <li>2. Click on “Login” button</li> </ol>	Alert message “username or password is incorrect”	Pass
	Login validation (Empty password field) <ol style="list-style-type: none"> <li>1. Enter “username” into username field</li> <li>2. Click on “Login” button</li> </ol>	Alert message “username or password is incorrect”	Pass
2	<b>Login for Store Clerk:</b> <ol style="list-style-type: none"> <li>1. Enter “clerk” into username field</li> <li>2. Enter “clerk” into password field</li> <li>3. click on “Login” button</li> </ol>	Verify that you see “Welcome Store Clerk” page after first login  Throughout the Store clerk login session, store clerk will see the following under navigation bar <ul style="list-style-type: none"> <li>• Retrieve from Store</li> <li>• Disbursement</li> <li>• Inventory</li> <li>• Data Analytics</li> </ul>	Pass

	<ul style="list-style-type: none"> <li>○ Year over Year Analysis</li> <li>○ Short Term Trend</li> <li>● Order</li> <li>● Supplier Delivery</li> <li>● Adjustment Voucher           <ul style="list-style-type: none"> <li>○ View all Voucher</li> <li>○ Create New Voucher</li> </ul> </li> <li>● Logout</li> </ul>	
Navigation in “Retrieve from Store” page (Store clerk login)	<p>Verify that you see the following columns in the table “Summary of items to collect”</p> <ul style="list-style-type: none"> <li>● Item</li> <li>● Quantity Requested</li> <li>● Item Location</li> </ul> <p>Verify that you see the following columns in the table “Disbursement Information”</p> <ul style="list-style-type: none"> <li>● Disbursement Id</li> <li>● Item</li> <li>● Quantity Disbursed</li> <li>● Status</li> <li>● Submit</li> </ul> <ul style="list-style-type: none"> <li>● Retrieved</li> <li>● Breakdown by Department           <ul style="list-style-type: none"> <li>○ Dept Name</li> <li>○ Outstanding</li> <li>○ Needed</li> <li>○ Actual</li> </ul> </li> </ul> <p>Once “Submit” button is clicked, update will be done and direct back to retrieval page. Item to collect quantity should either be reduced by submitted quantity or item entirely removed if item is fully collected.</p>	Pass
Validate Quantity Disbursed field:	<p>1. In the Retrieved field enter a character</p> <p>2. In the Retrieved field enter “-1”</p> <p>3. Click on “Update” button</p>	User is not able to key in a character other than numeric value. (point 1).

	User will be prompted “Value must be greater than or equal to 1” (Point 3)	
Navigation in “ <b>Disbursement</b> ” (Store clerk login) <ol style="list-style-type: none"> <li>1. Click on the Department filter and filter disbursement by specific department</li> <li>2. Click on the CollectionPoint filter and filter disbursement by specific collection point</li> <li>3. Set status for a request to Delivered.</li> <li>4. Find 2 orders by different departments for the same item.</li> <li>5. Click on ‘Edit’ to edit one of the department’s allocation.</li> <li>6. Choose the other department as a “Receiving Department”.</li> <li>7. In the Quantity to Transfer, enter a character</li> <li>8. In the Quantity to Transfer, enter a negative number</li> <li>9. Click on “Transfer” button</li> <li>10. In the Quantity to Transfer, enter a quantity less than the Actual Issuing Quantity</li> <li>11. Click on “Transfer” button.</li> </ol>	Verify that you the following columns are shown <ul style="list-style-type: none"> <li>• Disbursement Detail Id</li> <li>• Request Id</li> <li>• Department</li> <li>• Description</li> <li>• Unit of measurement</li> <li>• Quantity requested</li> <li>• Actual issuing quantity</li> <li>• Collection point</li> <li>• Status</li> <li>• Set status</li> <li>• Edit allocation</li> </ul> Filter shows results to specific department or collection point. Request indicated as Delivered should vanish from table (point 3). User directed to Edit page (point 5). User is not able to key in a character other than numeric value. (point 7). User will be prompted “Value must be greater than or equal to 1” (Point 10) Actual issuing quantity should be reduced by the amount indicated to transfer for the transferring department and added to the receiving department.	Pass
Navigation in “ <b>Inventory</b> ” (Store clerk login) <ol style="list-style-type: none"> <li>1. Search for ‘book’ under Search products.</li> <li>2. Filter search results by stock status under ‘show insufficient stock’.</li> </ol>	Verify that you the following columns are shown <ul style="list-style-type: none"> <li>• Item No</li> <li>• Description</li> <li>• Location</li> <li>• Quantity</li> <li>• Restock Level</li> <li>• Restock Quantity</li> </ul>	Pass

	<p>3. Click Adjust to make adjustments and simulate a stock-take.</p> <p>4. Click “Create New Voucher”.</p> <p>5. Adjust quantity by -1, and indicate reason as Missing from store.</p> <p>6. Select a voucher under “Add to voucher”</p> <p>7. Click “Save Adjustment”</p> <p>8. Filter Inventory to show insufficient stock.</p> <p>9. Click on any Supplier 1.</p> <p>10. Click on “Create New Order”.</p> <p>11. Click “Enquire Supplier”</p> <p>12. Click “Delete”</p> <p>13. Re-do steps 8-10 again.</p> <p>14. Click “Submit Order”.</p> <p>15. Click “Return”.</p>	<ul style="list-style-type: none"> <li>• Unit of Measure</li> <li>• Status</li> <li>• Supplier 1</li> <li>• Supplier 2</li> <li>• Supplier 3</li> <li>• Adjustment</li> </ul> <p>Filtered results should only show products with ‘book’ in description; and subsequently ‘books’ with insufficient stock.</p> <p>Adjustment should be saved under the stated voucher number. Check under “Adjustment Voucher”, “View all Voucher” “Detail” of the voucher number. (Point 7)</p> <p>A popup alert should indicate if there is an existing order. If there is none, you should be able to “Create New Order” (Point 9).</p> <p>An email should be sent out to the supplier querying on the availability (Point 11).</p> <p>Order should be deleted (Point 12).</p> <p>Order status for the specified order should now be “ORDERED”. (Point 14-15).</p>	
3	<p><b>Login for Department Employee:</b></p> <ol style="list-style-type: none"> <li>1. Enter “employee” into username field</li> <li>2. Enter “employee” into password field</li> <li>3. Click on “Login” button</li> </ol>	<p>Verify that you see “Welcome Department Employee” page after first login</p> <p>Throughout the Department employee login session, employee will see the following under navigation bar</p> <ul style="list-style-type: none"> <li>• Request <ul style="list-style-type: none"> <li>◦ View Request</li> <li>◦ Create Request</li> </ul> </li> <li>• Logout</li> </ul>	Pass
	<p>Navigation in “Create Request” page (Department employee login)</p>	<p>Unit of measure should automatically pop up once item is</p>	Pass

	<ol style="list-style-type: none"> <li>1. Select ‘TAPE’ from Category.</li> <li>2. Select ‘Scotch Tape’ from Item.</li> <li>3. In the Quantity, enter a character</li> <li>4. In the Quantity, enter a negative number.</li> <li>5. Enter 8 in Quantity.</li> <li>6. Search ‘Tape’ in “Show All Request” page.</li> <li>7. Select ‘EDIT’.</li> <li>8. Change Quantity to 10.</li> <li>9. Click on the final page of all requests.</li> </ol>	<p>selected.</p> <p>User is not able to key in a character other than numeric value. (point 3).</p> <p>User will be prompted “Value must be greater than or equal to 1” (Point 4)</p> <p>Request for tape is shown (Point 6, 9).</p> <p>Request quantity has changed (Point 8).</p>	
4	<p><b>Login for Department Head:</b></p> <ol style="list-style-type: none"> <li>1. Enter “head” into username field</li> <li>2. Enter “head” into password field</li> <li>3. Click on “Login” button</li> </ol>	<p>Verify that you see “Welcome Department Head” page after first login</p> <p>Throughout the Department Head login session, head will see the following under navigation bar</p> <ul style="list-style-type: none"> <li>• Approve Request</li> <li>• Approval History</li> <li>• Delegate Authority</li> <li>• Logout</li> </ul>	Pass
	<p>Navigation in “Delegate Authority” page (Department head login)</p> <ol style="list-style-type: none"> <li>1. Select ‘Manage Delegation’ for ‘James Lye’.</li> <li>2. Select ‘DEPARTMENT_HEAD_TEMP’ under Role to Assign.</li> <li>3. In the Start Date, enter today’s date.</li> <li>4. In the End Date, enter tomorrow’s date.</li> <li>5. Click ‘Update’.</li> <li>6. Select ‘Manage Delegation’ for ‘James Lye’.</li> <li>7. Click on ‘Delete’ button.</li> <li>8. Repeat Steps 1-5.</li> <li>9. Click ‘Logout’.</li> <li>10. Enter “jameslye” into username field</li> <li>11. Enter “english4” into password field</li> </ol>	<p>Delegation for James Lye shown (Point 4)</p> <p>Delegation for James Lye deleted (Point 7).</p> <p>Verify that you see “Welcome Department Head” page after James Lye login (Point 12).</p> <p>Verify that temporary head can approve requests (Point 14).</p> <p>Verify that James Lye has reverted to become an employee (Point 23).</p>	Pass

	<p>12. Click on “Login” button</p> <p>13. Click ‘Approve Request’ from the menu.</p> <p>14. Attempt to approve any request by toggling the status to ‘APPROVED’ and click submit.</p> <p>15. Logout.</p> <p>16. Log into head again.</p> <p>17. Navigate to Delegate Authority</p> <p>18. Select ‘Manage Delegation’ for ‘James Lye’.</p> <p>19. Click on ‘Delete’ button.</p> <p>20. Click ‘Logout’.</p> <p>21. Enter “jameslye” into username field</p> <p>22. Enter “english4” into password field</p> <p>23. Click on “Login” button</p> <p>24. Click “Logout”</p>		
5	<p><b>Login for Department Representative:</b></p> <ol style="list-style-type: none"> <li>1. Enter “representative” into username field</li> <li>2. Enter “representative” into password field</li> <li>3. Click on “Login” button</li> </ol>	<p>Verify that you see “Welcome Department Representative” page after first login</p> <p>Throughout the representative login session, representative will see the following under navigation bar</p> <ul style="list-style-type: none"> <li>• Change Collection Point</li> <li>• Collect Items</li> <li>• Logout</li> </ul>	Pass
	<p><b>Navigation in “Change Collection Point” page (Dep Rep login)</b></p> <ol style="list-style-type: none"> <li>1. In the Choose Collection Point field, select a different point from the Current Collection Point.</li> </ol>	<p>Verify that you see the following columns in the table “Summary of requests”</p> <ul style="list-style-type: none"> <li>• Request Id</li> <li>• Item</li> <li>• Quantity</li> </ul> <p>Verify that the current collection point changes to the selected point (Point 1).</p>	Pass

### **3. RECOMMENDATIONS**

From this project, we have learnt a lot more about how to develop a full-fledged commercial application involve multiple platforms (.NET Framework, Android and Python flask). Not only have we deepened our understanding of the programming aspects, but we also gain experience on how to properly manage a project to maximize our project's deliverables. For example, we have learned to plan to make up for lost time caused by the five days Chinese New Year Celebration. After the unexpected outbreak of the coronavirus, our group has to reduce the frequency of meetings and learn to coordinate online to ensure our project is on track despite the disruption.

In terms of technical skills, our team has gained exposure to developing a system that works across multiple frameworks (.NET, Android & Python flask). Challenges arose when services from the different platforms are communicating with each other, and our team has to put in extra efforts to resolve them. We benefited from this experience a lot because not everyone in our team has worked on a system similar to this.

### **4. LESSONS LEARNT**

For this project, our team has delivered a Stationery Store Inventory System (SSIS) that achieved the computerization of the stationery store inventory functions and automated several inventory management tasks for the store clerks. We have also implemented features in the system that aids university departments in the process of making requests for stationeries and receiving disbursement from the store clerk. With this foundation in place, our team will like to make some recommendations for further improvements in the systems.

Firstly, although the team has provided the store clerk most of the functions to carry out their tasks, the team did not manage to cater to the needs of the store supervisors and the store managers due to resources constraint and technical difficulties. Thus, the next step forward will be to implement additional functions in the SSIS to assist the supervisors and managers in their daily duty. These other functions include the function for the supervisor and manager to approve adjustment vouchers raised by the store clerks.

Secondly, the current system delivered has not yet implemented a computerized charge-back function to issue bills to the University departments based on the actual fulfillment of their stationery request. As this is one of the listed requests by the administration in the requirements document, the team strongly recommends that the next team focus on this inventory charge-back system in the following phase of development, building on the SSIS we have delivered.

Thirdly, although the team have implemented capability for the store clerks to visualize the short term trend of the stationery requests, and a function for store clerks to predict overall stationery demand for a period based on historical data, we believed that more analytics functions can be provided after all the requests and disbursement information are being

computerized with the current SSIS. Thus, we recommend that the next development team can investigate more ways to derive business intelligence from these data.

## 5. PROBLEMS AND SOLUTIONS

In terms of project execution, the team has encountered two major issues. As mentioned afore in the lessons learned section, the team lost some days due to the five days Chinese New Year break. To compensate for this, the team decided to expedite the work progress in the first week of the project. With excellent teamwork and extra effort put in, our team managed to complete additional tasks in the first week to offset the lost days.

After the outbreak of the coronavirus in Singapore, the team decided to reduce the frequency of meetings on Campus to minimize the risk of infection. Few meetings impacted our work coordination, and there were times when members of the team were unaware of each other's progress. To counter this issue, the team updated their work status more frequently in the project chat group, and make use of the file-sharing function in the chat group to standardize information sharing within the team — this helps to mitigate the impact of meeting less frequently.

In terms of technical work, the team faced issues while working on frontend development as some of the features in the user interface are challenging to implement. The team encountered the most problems when working with android due to lack of experience. To resolve this, we have to cater more times to the android development phrase and simplified some of the mobile application features.

More technical issues are encountered when we were integrating the .Net MVC application with android application and the python flask web application. One problem we faced is that we realize we have to duplicate a lot of our code when we are coding the REST API for the android application. To improve on code reusability, we added a service layer to our backend to store those methods that we need to reuse for the REST API. The separation of service layers improved the quality of our final delivered solution.

Other technical issues we encounter are related to communication between the different frameworks. A particularly tricky problem we face was the sending of https requests from the Android emulator to the localhost. We need to do additional configurations and workarounds for the android application to communicate with our .Net MVC server successfully. Because the team makes use of python to implement analytics capability to the SSIS, we hit a roadblock when we want to send a plotted graph from the python flask server back to the .Net MVC server. Some extra effort was spent to understand how to decode an image file and convert it into a string format that can be sent via JSON.

Other than what was mentioned above, the team has encountered many other technical difficulties which we resolved by doing research online and conducting trials and errors. These will not be discussed here for the sake of brevity.

## **6. LOOKING BACK**

We could have spent more time refining the ERD diagram, since the ERD diagram is the foundation of the coding project. Throughout the project, we had to do many migrations to edit the database, which was a long and painful process filled with bugs.

We should also have integrated and tested more frequently. This way, the compilation will be less arduous, and the bugs would not have compounded.

Lastly, we should also have time-boxed our sprints, so that we will have adequate time for all features.

Nevertheless, this AD project was a good learning experience for us all. It was the first time we were properly introduce to APIs, having to communicate information between the backend server, android and the python flask.