



STATIONERY STORE

Stationery Store Inventory System

Project Report

Team – 6

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1.INTRODUCTION

This project report is based on the software solution designed for LOGIC University Stationary Store Inventory System. It aims to deliver an automated system that enables maintaining of the inventory efficient and less cumbersome. Currently the store is dependent heavily on manual work and documents are kept in hardcopies. Due to the lack of automation the store suffers from inefficiency in all aspects including communication, documentation and delivery.

Current problems faced by the users include:

1. Manual bookkeeping and updating of documents is troublesome and documents could be lost resulting in loss of important information.
2. Manual generation of reports is time consuming.
3. Frequent depletion of stocks in the warehouse resulting in unhappiness and complaints from departments.
4. Consolidation of stationery requests consumes a lot of time and that causes delay in gathering stocks from the store (Snowball effect).
5. Changes in department representatives and collection points is not effectively communicated to the store clerk.
6. Department representatives are not informed promptly for collection of inventories.

The project report addresses the project's primary aim to computerize the inventory functions for the stationery store and requisition functions for the various departments of the university, incorporating the use of the university's email system for store inventory functions.

The inventory system will be utilised by the stationery inventory store department of the university. The system will be maintaining a total of 90 categories of stationery to be used by all the departments in the university

1.1 ACTIVITIES IN PROJECT

The main activities of the project include the phases of the Software Development Life Cycle (SDLC).

Phases of SDLC	Elaboration
Project Planning	Produce project work plan, project charter, project schedule and progress reports
Requirements Identification	Perform user requirements gathering
Requirements Specification:	Produce UI design specification and meet users to review UI requirements
Analysis Modelling	Identify analysis objects and attributes

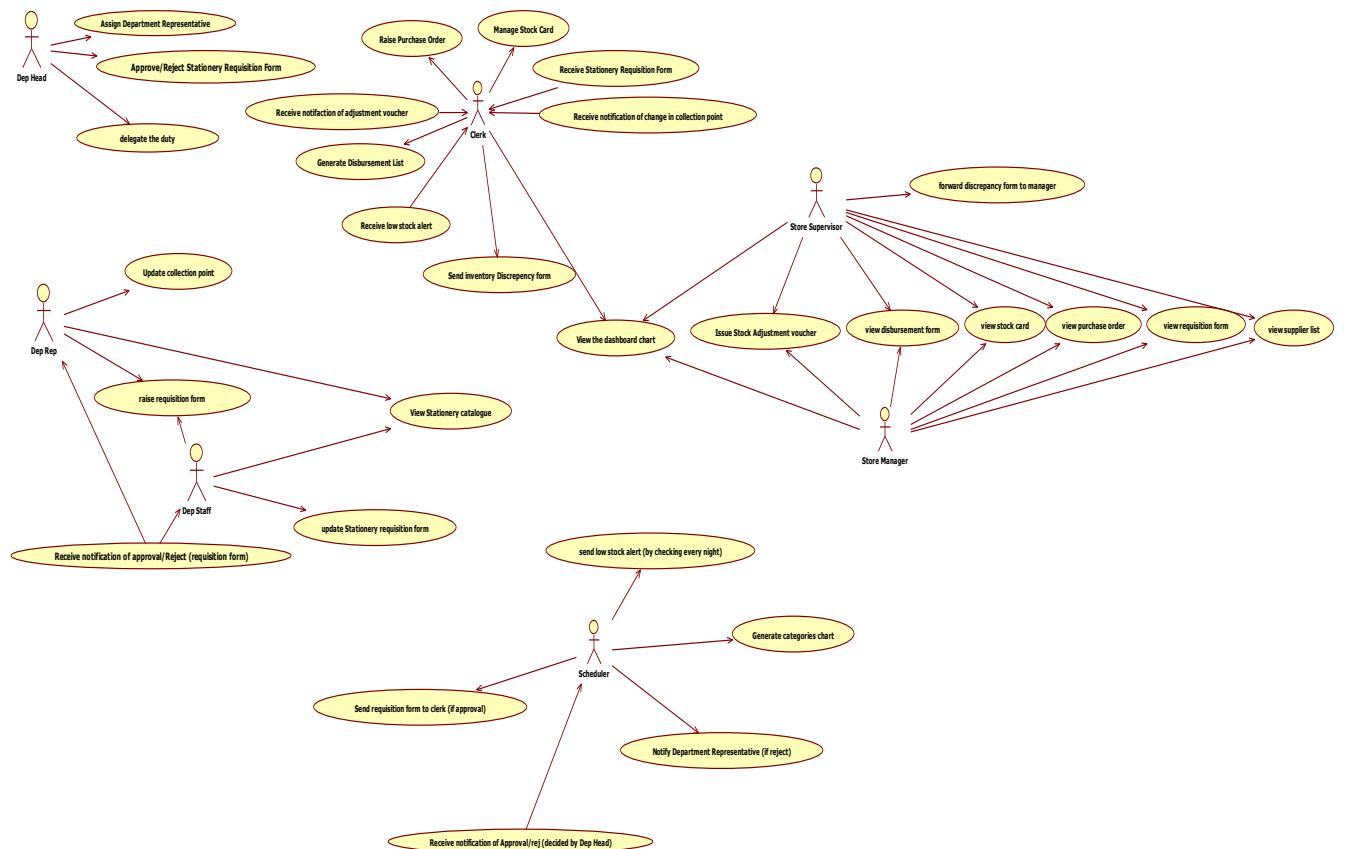
Design Modelling	<ul style="list-style-type: none"> • Identify & define architectural platform. • Produce sequence diagrams, • Class diagrams, • statechart diagram, • machine learning documentation • relational database design
Implementation	Produce functional codes and working web and mobile application
Integration Testing	<ul style="list-style-type: none"> • Perform functional and unit testing for each use case • Integrate codes
Deployment	Develop UAT performance test plans. Conduct performance testing.
User Acceptance	Conduct user acceptance test. Review test results. Hold hand-over meeting and sign off

2. PRODUCT DELIVERABLES

2.1. REQUIREMENT CAPTURE WORKFLOW (REQUIREMENT MODELS)

2.1.1 REQUIREMENT SPECIFICATION (FUNCTION REQUIREMENTS)

2.1.1.1. Use case diagram



2.1.1.2. Actors (name and definition)

Department

Department Staff:

- Employee of a university department
- Able to request stationery through stationery requisition form

Department Head:

- Head of department
- Authorised to approve/reject staffs' requisition form
- Able to delegate another staff to take over the role for a period

Department Representative

- Department staff responsible for collection of stationery on a fixed day every week(Monday)

Store

Store Clerk:

- Store Clerk of Store department

Store Supervisor:

- Able to approve adjustment voucher less than or equal to \$250

Store Manager

- Able to approve adjustment voucher more than \$250

2.1.1.3. Use cases (name and definition)

Use Cases	Definition
Login	Allows store and department employees to log into the system
View Catalogue	Allows users to see the list of stationeries available
View Requisition	Allows the department head to view the requisition submitted by department staff
Raise Purchase Order	Allows store clerk to create purchase order to order items from the designated supplier
View Stock Card Transitions	Allows store staffs to view the transaction details of the flow of stationeries and display the final quantity of stationery after the latest transaction
Receive notification of change in collection point	When there is a change of collection point on the department side, the store clerk receives an email alert stating the change
Generate Disbursement List	Create disbursement list
Receive Low Stock Alert	When the stock quantity of a stationery item drops below the set minimum amount of stock the clerk receives an email alert notification
Raise discrepancy form	Updated when there is a discrepancy between the quantity of requested goods and quantity of goods accepted by department representative

View Dashboard	Allow department head to view the trend of ordered stationeries and compare them across months
Assign Department Representative	Allow department head to assign a representative for his/her department
Approve/Reject Stationery Requisition Form	Allow the department head to approve or reject the requisition form submitted by department staffs
Delegation	Allow the department head to assign a temporary department head to take over his role for a specified period of time
Update Collection Point	Allow the department representative to change the collection point most convenient to him/her
Raise Requisition Form	Allow department staffs to submit requisition forms to their respective department head for approval
Receive Notification of Approve/Reject Requisition Form	Allow department staffs to receive an email notification about the status of their submitted requisition forms
Update Stationery Requisition Form	Allows department staffs to modify their requisition forms before the department head approves/rejects their request
Issue Adjustment Voucher	Allow store manager / store supervisor to issue an adjustment voucher to correct the discrepancy occurred
View Disbursement Form	Allow store employees to view the auto-generated disbursement form
View Purchase orders	Allow store employee to view the list of purchase orders made to supplier
View Supplier List	Allows store employees to view the top 3 priority suppliers of a specific stationery

2.1.2 REQUIREMENT SPECIFICATION (NON-FUNCTIONAL)

2.1.2.1. User Volume

User group	Country/location/count	remarks
Department Head	S'pore / Jurong/ 10	Department Head needs to use the system every day for authorizing employees' requisition form and when they want to delegate their authority to another employee during their absence.
Department Representative	S'pore / Jurong / 10	Department Representative needs to use the system every day for submitting their own requisition forms and acknowledging the disbursement form at the collection point
Department Employee	S'pore / Jurong / 480	Employee needs to use the system every day for submitting their requisition form
Store Manager	S'pore / Jurong/ 1	Store Manager needs to use the system every day, mainly for issuing adjustment voucher and view the analytical trend dashboard charts , but he also has access to view all the form at any time.
Store Supervisor	S'pore /Jurong / 1	Store Supervisor needs to use the system to issue voucher when there is any item discrepancy under \$ 250.
Store Clerk	S'pore / Jurong / 3	Clerks need to use the system every day, they are not office bounded, they can use the system either in warehouse or at collection point

2.1.2.2. Use Case Transaction Volume

Biz transaction [use case]	Business criticality [critical/ moderate / low]	No. of user	Transaction information	Concurrent important activities
Assign department representative	Moderate/Low	10	Absence----1 time Non-absence---0	
Delegate the duty	Moderate/Low	10	1 time per quarter per department head	
Approve/reject stationery requisition form	Critical	10	5 times per week per dep head	

View stationery catalogue	Critical	500	1 time per day per staff	
Update collection point	Critical	10	If any change ----one time per week If not ----0	
Acknowledge Disbursement List	Critical	10	1 time per week per staff	
Send form requisition for approval	Critical	50	1 time per week per staff (without change)	
Manage stationery requisition form	Low	50	1 time per week per staff (if any change employee wants to make)	
Raise purchase order	Critical	3	1 time per 2 weeks	
Receive adjustment voucher	Critical	3	1 time per month	
Generate Disbursement List	Critical	3	10 times per week	
Receive low stock alert	Critical	3	1 time per 2 week	
Send inventory discrepancy form	Critical	3	1 time per month	
Generate stationery retrieval form	Critical	3	1 time per week	
Receive notification of change in collection point	Low	3	Around 2 times per quarter	
Receive stationery requisition form	Critical	3	50 times per week	
Manage stock card	Critical	3	1-3 times per week	
Forward discrepancy form to manager	Moderate	1	1 time per month	
Issue stock adjustment voucher	Critical	1	1 time per month	
View the dashboard chart	Critical	5	1 time per month	
View stock card	Low	1	1 time per week	
View requisition form	Low	1	1 time per week	
View purchase order	Low	1	1 time per week	
View discrepancy form	Low	1	1 time per week	
View disbursement form	Low	1	1 time per week	
View Supplier List	Low	1	1 time per week	

2.1.2.3. Entity Volume

Business entity class	Source document	Retention period	Target volume
Department	Department Record	Forever	10
Collection Point	Department Record	1 year	6
User	User Record	Forever	$50*10+1+1+3=505$
Stationery	Stationery Record	3 years	At most: $90*3=270$
Category	Stationery Record	3 years	$90*3=270$
Purchase_Order	Purchase Order Record	3 years	$52/2*3=78$ (52 weeks in a year, purchase order every two weeks)
Incoming_Stock	Purchase Order Record	3 years	$52/2*3=78$ (52 weeks in a year, purchase order every two weeks)
Supplier	Supplier List	3 years	At most $10*3=30$
Stock_Card	Stock Card List	3 years	$90*3=270$
Stock_Card_Details	Stock Card List	3 years	$90*3=270$
Requisition_List	Requisition List	3 years	$5*52**10*3=7800$
Requisition_Details	Requisition List	3 years	$5*52*10*3=7800$
Disbursement_List	Disbursement List	3 years	$52*3*10=1560$
Disbursement_Details	Disbursement List	3 years	$52*3*10=1560$
Discrepancy	Discrepancy Record	3 years	Around $5*12*3=180$ (Assume that for all departments, there are 5 discrepancy form in total)
Delegation	Delegation record	1 year	$1*10*4=40$

2.1.2.4. Security Requirement and access matrix

Data [entity class]\user role[actor]	Department Head	Department Representative	Department Employee	Store Manager	Store Supervisor	Store Clerk
Department	X (r)	X (r)	X (r)	X (r)	X (r)	X (r)
User	X(c,r,u,d)	X(r)	X(r)	X(r)	X(r)	X(r)

Stationery	X(r)	X(r)	X(r)	X(c,r,u,d)	X(r)	X(r,u)
Category	X(r)	X(r)	X(r)	X(c,r,u,d)	X(r)	X(r,u)
Purchase_Order				X(r)	X(r)	X(c,r, u,d)
Incoming_Stock				X(r)	X(r)	X(c,r, u,d)
Supplier				X(r)	X(r)	X(r)
Stock_Card				X(r)	X(r)	X(r,u ,d)
Stock_Card_Details				X(r)	X(r)	X(r,u)
Requisition_List	X(c,r,u,d)	X(c,r,u,d)	X(c,r,u,d)	X(r)	X(r)	X(r)
Requisition_Details	X(r)	X(r)	X(r)	X(r)	X(r)	X(r)
Disbursement_List		X(r)		X(r)	X(r)	X(c,r, u)
Disbursement_Details				X(r)	X(r)	X(r,u)
Discrepancy				X(r)	X(r)	X(c,r, u)
Delegation	X(c,r,u,d)	X(r)	X(r)			

2.1.3 UI SPECIFICATIONS (Screen Prototype)

2.1.3.1. SCREEN PROTOTYPE FOR EACH USE CASE

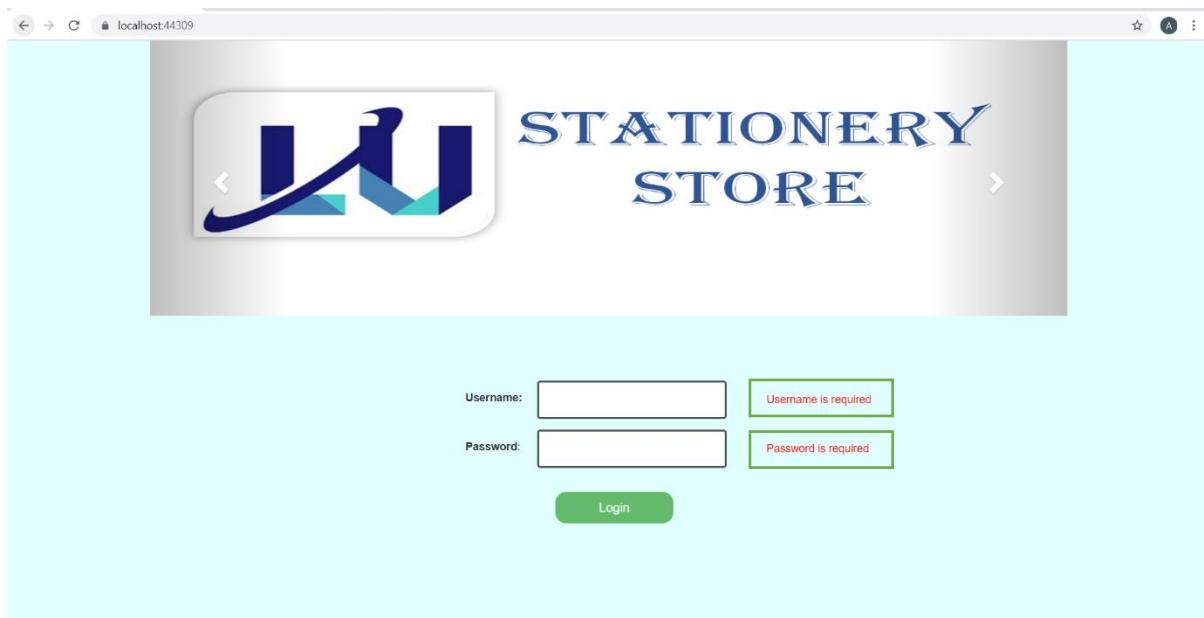
Web Interface

LOGIN (GENERAL PAGE)

1. Enter your corporate username and password as assigned by your department.
2. Click on the “Login” button to enter the main page.

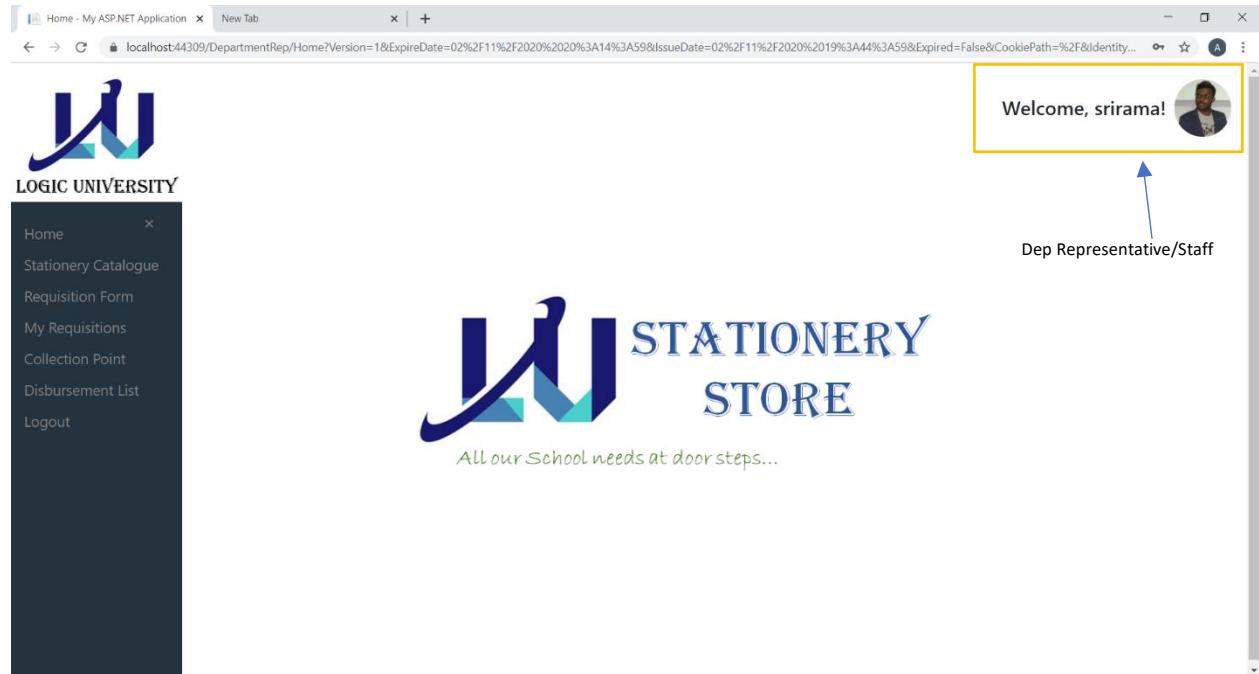


3. Both Username and Password is required to Login



DEPARTMENT REPRESENTATIVE/ STAFF

Department Representative will see the following screen once logged in.



The tasks that the department representatives are authorised to do so are

- View **Stationery Catalogue** and create the requisition form
- View the **Requisition Forms** and submit/save/cancel the form
- View the status of the forms under **My Requisitions**
- Change/Update **Collection Point**
- View **Disbursement List**
- Able to **Logout**

New Requisition/Catalogue

- 1) Stationary Catalogue will display all the stationary items
- 2) Enter the required quantity
- 3) Click “Add” to add the item to the Requisition form
- 4) Items should be added one at a time

1

Item Name	Unit Of Measure	Required Quantity	
Clips Double 1"	Dozen	<input type="text"/>	<button>ADD</button>
Clips Double 2"	Dozen	<input type="text"/> 2	<button>ADD</button>
Clips Double 3/4"	Dozen	<input type="text"/>	<button>ADD</button>
Envelop Brown(3"x6")	Each	<input type="text"/>	<button>ADD</button>
Envelop White(3"x6")	Each	<input type="text"/>	<button>ADD</button>
Envelop Brown(5"x7")	Each	<input type="text"/>	<button>ADD</button>
Eraser(hard)	Each	<input type="text"/>	<button>ADD</button>

Requisition Forms

- 1) Requisition Form will display the all the items added from the Stationery Catalogue
- 2) Click the “Remove” Button to remove the item from the list
- 3) Click the “Save” Button to ensure that the items are remembered even if user decides to Logout before clicking “Submit Form”
- 4) Click “Submit Form” to send the form to Department Head for approval

1

2

Item Name	Unit Of Measure	Required Quantity	
Clips Double 3/4"	Dozen	<input type="text"/> 9	<button>Remove</button>
Envelop White(3"x6")	Each	<input type="text"/> 9	<button>Remove</button>
Envelop Brown(5"x7")	Each	<input type="text"/> 9	<button>Remove</button>

3

4

View List of Submitted Requisitions

- 1) Click My Requisition on the side bar to view the status of the requisition forms sent to department head
- 2) Click View to see the details of a particular requisition form

The screenshot shows a web browser window titled 'MyRequisitions - My ASP.NET App'. The URL in the address bar is 'localhost:44309/DepartmentRep/MyRequisitions'. The page header includes the Logic University logo and a welcome message 'Welcome, sirrama!' next to a user profile picture. On the left, a dark sidebar menu lists: Home, Stationery Catalogue, Requisition Form, **My Requisitions** (which is highlighted with a red box and has a '1' callout), Collection Point, Disbursement List, and Logout. The main content area is titled 'My Requisitions' and displays a table of requisition data. The table has columns: RequestID, Date Of Submission, Status of Request, and a 'View' button. There are four rows of data:

RequestID	Date Of Submission	Status of Request	
454551	11/02/2020	PendingforApproval	2 View
454550	11/02/2020	Approved	View
454549	10/02/2020	Rejected	View
454548	10/02/2020	Delivered	View

View, Cancel or Reorder Past Requisitions

- 1) Click 'Reorder' to create another Requisition Form under My Requisition with the same set of stationeries
- 2) Click 'Cancel Order' to cancel the order that is pending for approval from the Department Head

ViewRequestInfo - My ASP.NET / +

localhost:44309/DepartmentRep/ViewRequestInfo



Welcome, sirama! 

LOGIC UNIVERSITY

- Home
- Stationery Catalogue
- Requisition Form
- My Requisitions
- Collection Point
- Disbursement List
- Logout

Request Details

Request ID: 454551	Date of submission: 11/02/2020	Status of Request: PendingforApproval
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Requisition Form

ItemName	Unit of Measure	Order Quantity
Clips Double 3/4"	Dozen	9
Envelop White(3"x6")	Each	9
Envelop Brown(5"x7")	Each	9

ReOrder
Cancel Order

- 3) In the event where the status of the approval is ‘Rejected’ or ‘Approved’ or ‘Delivered’ only ‘ReOrder’ button will be visible as shown below

ViewRequestInfo - My ASP.NET / +

localhost:44309/DepartmentRep/ViewRequestInfo



Welcome, sirama! 

LOGIC UNIVERSITY

- Home
- Stationery Catalogue
- Requisition Form
- My Requisitions
- Collection Point
- Disbursement List
- Logout

Request Details

Request ID: 454548	Date of submission: 10/02/2020	Status of Request: Delivered
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Requisition Form

ItemName	Unit of Measure	Order Quantity
Envelop Brown(3"x6")	Each	9

ReOrder

Update Collection Point (Department Representative Only)

- 1) Collection Point will display the current collection point and the other possible collection points as radio buttons
- 2) Click any one of the collection points displayed under 'Change Collection point to:'
- 3) Click 'Update' button

The screenshot shows a web browser window titled "CollectionPoint - My ASP.NET App". The URL is "localhost:44309/DepartmentRep/CollectionPoint". The page header includes the "LOGIC UNIVERSITY" logo and a welcome message "Welcome, srirama!". On the left, a sidebar menu lists: Home, Stationery Catalogue, Requisition Form, My Requisitions, **Collection Point**, Disbursement List, and Logout. A red box labeled "1" highlights the "Collection Point" link in the sidebar. The main content area has a heading "Collection Point:" with a sub-section "Current CollectionPoint:" containing a text input field with the value "School of Computing". Below it is a section "Change Collection point to:" with a list of collection points: School of Computing, NUS Business School, Department Seminar hall, Department Computer Lab, School of Science, and NUS High School. A red box labeled "2" highlights the list of collection points. An arrow points from the "Current CollectionPoint:" text input to the "Change Collection point to:" list. A blue box labeled "3" highlights the "Update" button at the bottom right of the list.

View Disbursement List (Department Representative Only)

The screenshot shows a web browser window titled "DisbursementList - My ASP.NET App". The URL is "localhost:44309/DepartmentRep/DisbursementList". The page header includes the "LOGIC UNIVERSITY" logo and a welcome message "Welcome, srirama!". On the left, a sidebar menu lists: Home, Stationery Catalogue, Requisition Form, My Requisitions, **Collection Point**, **Disbursement List**, and Logout. A red box labeled "1" highlights the "Disbursement List" link in the sidebar. The main content area has a heading "Disbursement List" and a table:

DisbursementID	Disbursement Status	Collection Point
272727	pending	School of Computing

A red box labeled "2" highlights the "View" button next to the last row of the table. A blue box labeled "3" highlights the row itself. An arrow points from the "View" button to the row.

View Details of Specific Disbursement List (Department Representative Only)

The screenshot shows a web browser window titled "ViewDisbursementDetail - My App". The URL is "localhost:44309/DepartmentRep/ViewDisbursementDetail". The page header includes the "LOGIC UNIVERSITY" logo and a welcome message "Welcome, srirama!" with a profile picture. On the left, a sidebar menu lists: Home, Stationery Catalogue, Requisition Form, My Requisitions, Collection Point, Disbursement List, and Logout. The main content area is titled "ViewDisbursementDetail" and shows a table of disbursement details:

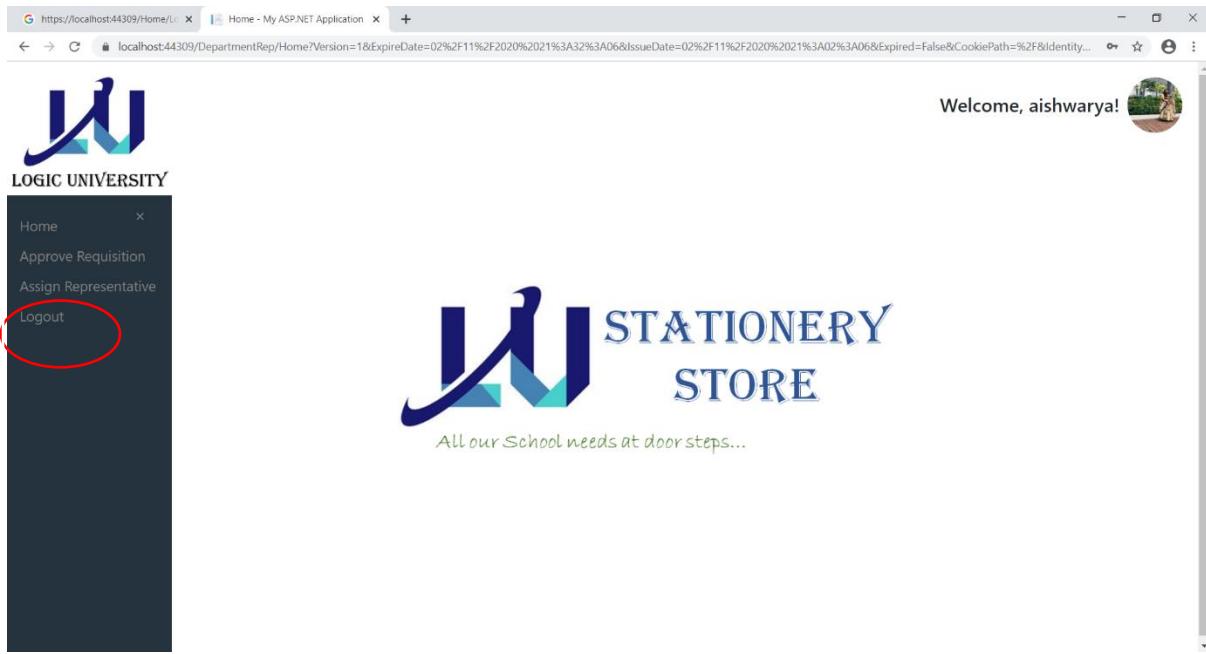
Item Name	Unit of Measure	Order Quantity	Delivered Quantity
Clips Double 1"	Dozen	9	9
Clips Double 2"	Dozen	9	9
Envelop Brown(3"x6")	Each	27	27
Envelop Brown(5"x7")	Each	9	9
Eraser(hard)	Each	18	18

DEPARTMENT HEAD / TEMPORARY DEPARTMENT HEAD

Department Head will see the following screen once logged in.

The screenshot shows a web browser window titled "Home - My ASP.NET Application". The URL is "localhost:44309/DepartmentRep/Home?Version=1&ExpireDate=02%2F12%2F2020%2006%3A13%3A23&IssueDate=02%2F12%2F2020%2005%3A43%3A23&Expired=False&CookiePath=%2F&Identity...". The page header includes the "LOGIC UNIVERSITY" logo and a welcome message "Welcome, shiva!" with a profile picture. On the left, a sidebar menu lists: Home, Approve Requisition, Assign Representative, Collection Point, Delegation, and Logout. The main content area features the "STATIONERY STORE" logo with the tagline "All our School needs at door steps...".

Temporary Department Head will see the following screen once logged in. Temporary Department Head will not be able to delegate another staff to take over his temporary role as a Department Head or change collection point



The tasks that the department head and temporary department head are authorised to do so are

- **Approve the Requisition Form**
- **Assign Representative**
- Change the **Collection Point** (department head only)
- **Delegate** another staff to takeover for a time-period (department head only)
- Able to **Logout**

Approve Requisition Form

- 1) Click Approve Requisition on the side bar to view all the requisition forms pending for approval.
- 2) Click "View" to see the details of the requisition form.

Requisitions

RequestID	Employee Name	Date Of Submission	Status of Request
454560	srirama	12/02/2020	PendingforApproval
454561	srirama	12/02/2020	PendingforApproval
454562	srirama	12/02/2020	PendingforApproval
454563	srirama	12/02/2020	PendingforApproval
454564	srirama	12/02/2020	PendingforApproval

Request Details

Request ID: 454560	Date of submission: 12/02/2020	Status of Request: PendingforApproval
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Requisition Form

ItemName	Unit of Measure	Order Quantity
Eraser(hard)	Each	9
Envelop Brown(5"x7")	Each	9

Comments:

Reject **Approve**

- 1) Click 'Approve' to approve the requisition or click 'Reject' to reject the requisition
- 2) **Comments are optional** and to add comments simply type them in the 'Comments' box

Assign Department Representative

- 1) Click Assign Representative on the side bar to assign a new staff to be the Department Representative
- 2) Select the name of the Employee by clicking 'Select Employee' through a dropdown list
- 3) Click 'Assign' to assign a Department Representative.

The screenshot shows a web application interface. At the top, there's a header with the title 'Assginrepresentative - My ASP.NET' and a URL 'localhost:44309/DepartmentRep/Assginrepresentative'. On the right, it says 'Welcome, shiva!' with a profile picture. The main content area has a logo for 'LOGIC UNIVERSITY' and a title 'Assign Representative'. On the left, a sidebar menu includes 'Home', 'Approve Requisition', **Assign Representative** (which is highlighted with a red box), 'Collection Point', 'Delegation', and 'Logout'. In the main content area, there's a section for 'Current Department Representative : SuSu'. Below it, there's a form for 'Change Department Representative to:' with a dropdown menu labeled 'Select Employee *' containing options: 'Select Employee', 'srirama', 'Alice', and 'surya'. A blue 'Assign' button is at the bottom of the dropdown menu. Three numbered boxes are overlaid on the screenshot: '1' points to the 'Assign Representative' menu item in the sidebar; '2' points to the dropdown menu for selecting a new representative; and '3' points to the 'Assign' button.

Update Collection Point (Department Head Only)

- 1) Collection Point will display the current collection point and the other possible collection points as radio buttons
- 2) Click any one of the collection points displayed under 'Change Collection point to:'
- 3) Click 'Update' button

The screenshot shows a web application window titled "CollectionPoint - My ASP.NET App". The URL is "localhost:44309/DepartmentRep/CollectionPoint". The header includes the university logo and a welcome message "Welcome, shiva!". On the left, a sidebar menu lists: Home, Approve Requisition, Assign Representative, **Collection Point** (highlighted with a red box), Delegation, and Logout. A number "1" is placed next to the sidebar. The main content area has a heading "Collection Point:" and a sub-section "Current CollectionPoint: NUS Business School". Below it is a "Change Collection point to:" dropdown menu containing: School of Computing, NUS Business School, Department Seminar hall, Department Computer Lab, School of Science, and NUS High School. A red box surrounds the dropdown menu. A blue "Update" button is at the bottom right of the dropdown. A number "2" is placed next to the dropdown, and a number "3" is placed next to the "Update" button.

Delegation of Authority (Department Head Only)

- 1) Click Delegation on the side bar to view the past history of the delegations made
- 2) Click Delegate to assign a new staff to take over the role of department head for a time-period

The screenshot shows a web application window titled "ViewDelegations - My ASP.NET App". The URL is "localhost:44309/DepartmentRep/ViewDelegations". The header includes the university logo and a welcome message "Welcome, shiva!". On the left, a sidebar menu lists: Home, Approve Requisition, Assign Representative, Collection Point, **Delegation** (highlighted with a red box), and Logout. A number "1" is placed next to the sidebar. The main content area has a heading "Delegations" and a table with three columns: Employee Name, Start Date, and End Date. One row shows Sandeep, 2/12/2020, and 2/12/2020. To the right of the table is a red "Cancel" button. A blue arrow points from the text "Click cancel to cancel the delegation" to the "Cancel" button. A blue "Delegate" button is located at the bottom right of the table area. A number "2" is placed next to the "Delegate" button.

- 3) Select the “StartDate” and “EndDate” by calendar picking

The screenshot shows a web application titled "Allocation of Temporary Authority". On the left is a sidebar with links: Home, Approve Requisition, Assign Representative, Collection Point, Delegation, and Logout. The main area has three input fields: "StartDate" (02/12/2020), "EndDate" (02/14/2020), and "Select Employee". Below these is a calendar for February 2020. A blue arrow points from the text "EndDate" must be after "StartDate" to the "EndDate" field. A number "3" is in a box over the "EndDate" field.

"EndDate" must be
after "StartDate"

- 4) Select the name of the Employee by clicking ‘Select Employee’ through a dropdown list
 5) Click ‘Allocate’ to delegate/assign a temporary Department Head.

The screenshot shows the same application. The "EndDate" field now contains "02/14/2020". The "Select Employee" dropdown menu is open, showing options: "Select Employee", "srirama", "Alice", and "surya". The option "Alice" is highlighted with a blue background. A number "4" is in a box over the dropdown menu. A number "5" is in a box over the "Allocate" button.

Additional Value-Add Feature

- 1) The first additional Feature allows users to see their favourite products and shows them in a list

The screenshot shows the IMPEKABLE software interface. On the left, a dark sidebar menu includes 'Favourite Products List' and 'Help Center'. The main content area is titled 'Favourite Products List' and displays a table titled 'Top Products' with four rows:

PRODUCT	AVAILABILITY	ACTION
Paper Clip	320 In Stock	Heart icon
Stapler	Out of Stock	Heart icon
Eraser	3 In Stock	Heart icon

At the bottom right of the table, there is a 'Show More' link.

- 2) The second additional feature allows customer to view the user manual under the help centre page when they are unsure how to operate the system

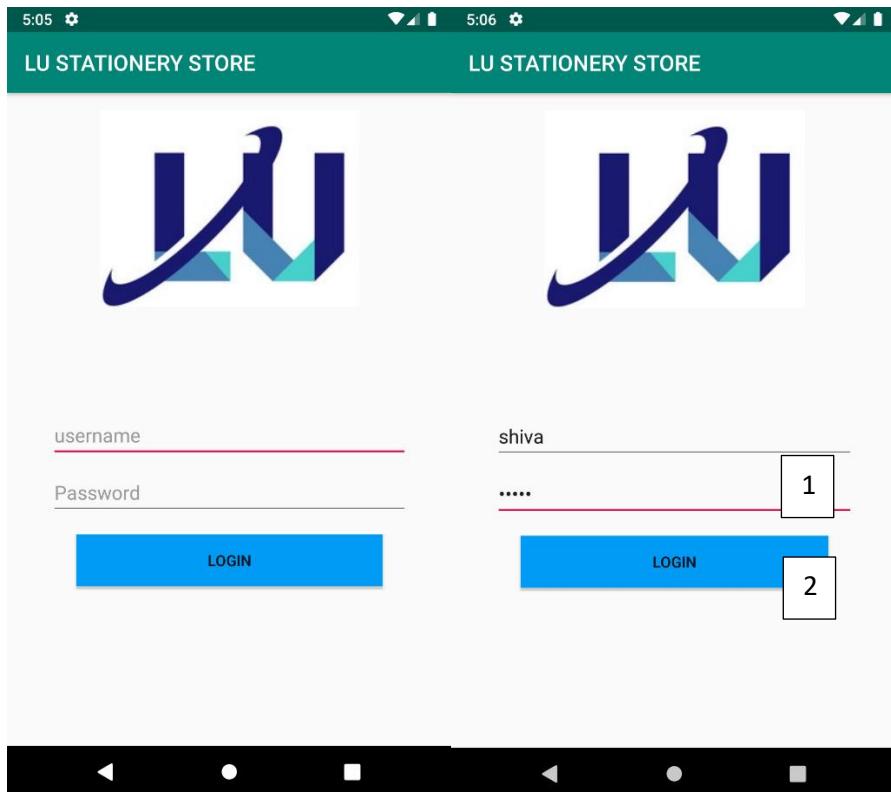
The screenshot shows the IMPEKABLE software interface. The left sidebar menu has 'Help Center' selected, indicated by a red box. The main content area is titled 'User Manual' and displays a Microsoft Word document window. The document title is 'User Guide Template - Blue Theme -...'. The content of the document includes a logo for 'STATIONERY STORE' and the text 'Stationery Store Inventory System User Guide' and 'User Manual for Departments'.

Mobile Features (Department Head)

Department Head can assign Department Representative and delegate authority on mobile.

Login

- 1) Enter email address and password
- 2) Click on "Login"



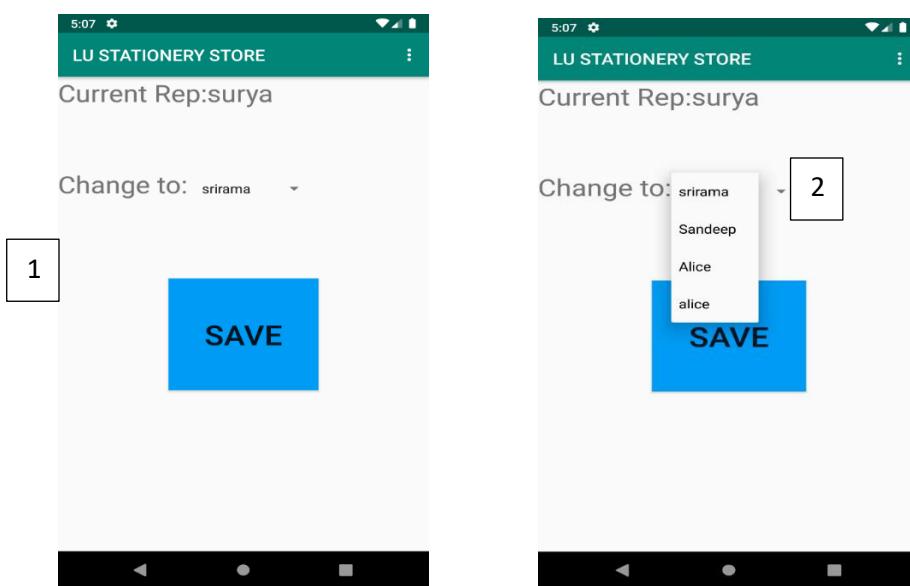
Once logged-in Department Head can choose between the 2 tasks that he wants to access

- 1) Click “Assign Representative” button - to Delegate a temporary authority to a staff
- 2) Click “Assign Representative” button – to assign a department representative



Assigning Representative

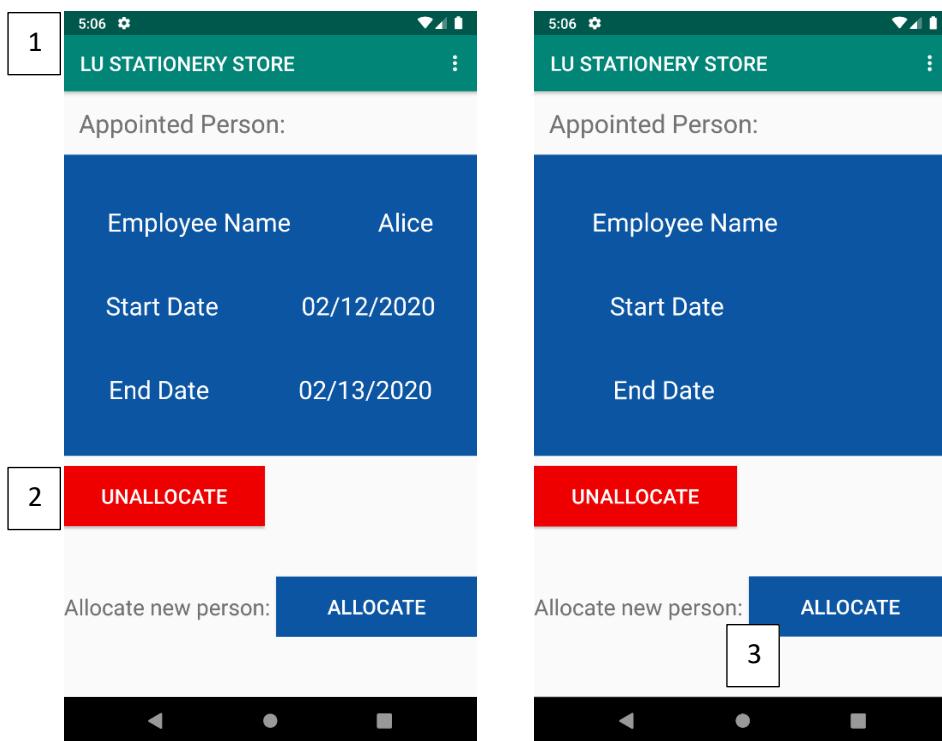
- 1) Current Representative will be shown on the top
- 2) Click the “Change to:” box to select a representative from the drop-down list
- 3) Click the “Save” button to confirm the assigning of the representative
- 4) Click the “Logout” button to logout from the screens



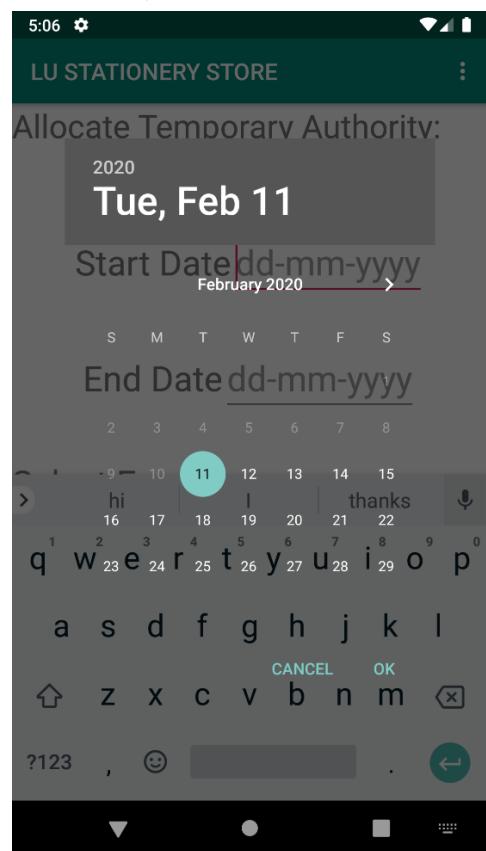
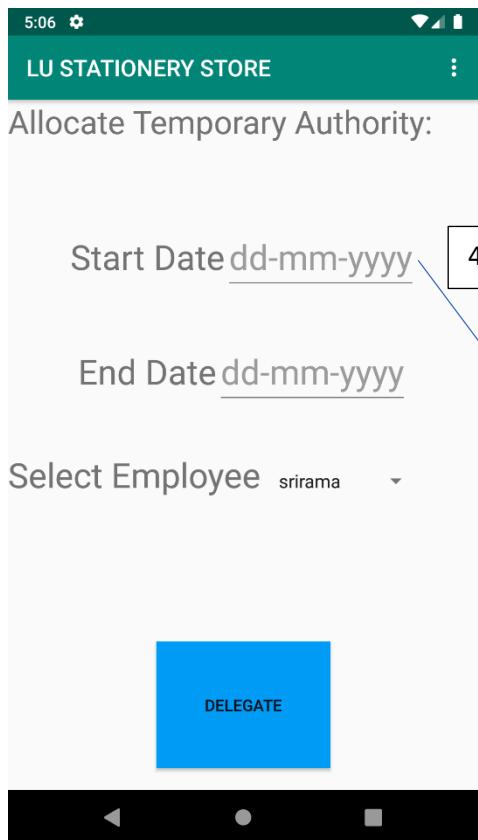


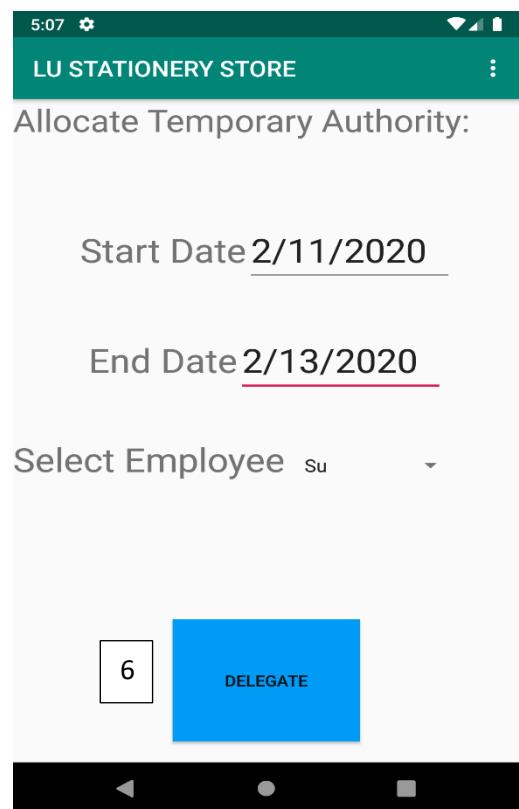
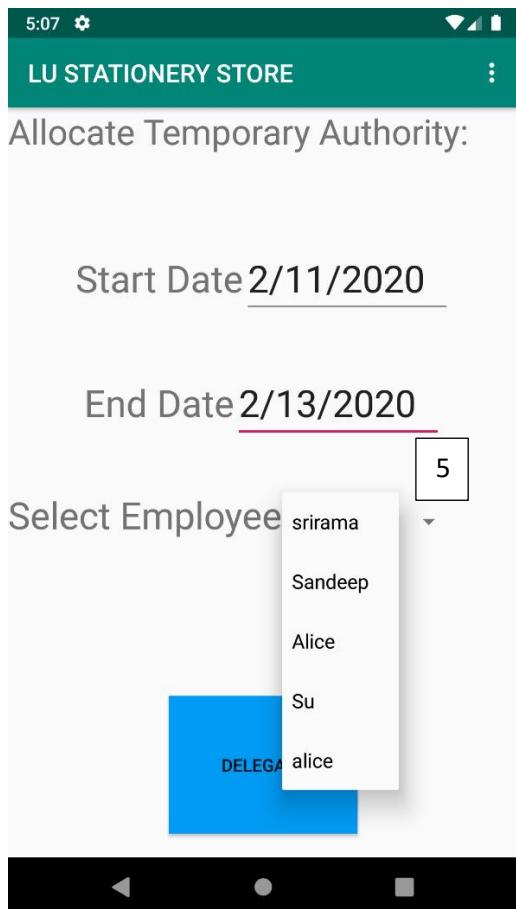
Delegate Temporary Authority

- 1) Details of previously delegated staff will be displayed in the first screen
- 2) Click the “UNALLOCATE:” button to remove the delegated person
- 3) Click the “ALLOCATE” button to allocate a new temporary authority

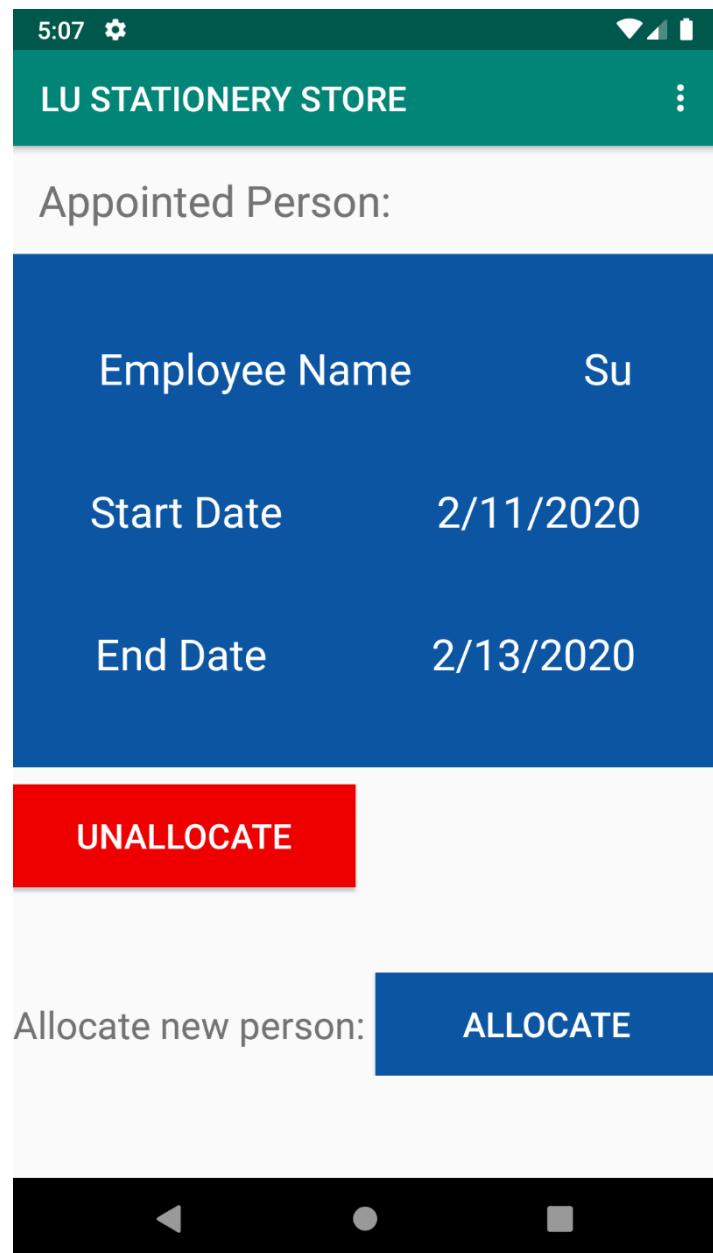


- 4) In the next screen input the Start Date and End Date by calendar picking
- 5) Select the delegated staff by selecting the names from the drop- down list
- 6) Click “Delegate” button to confirm the delegation of the new staff





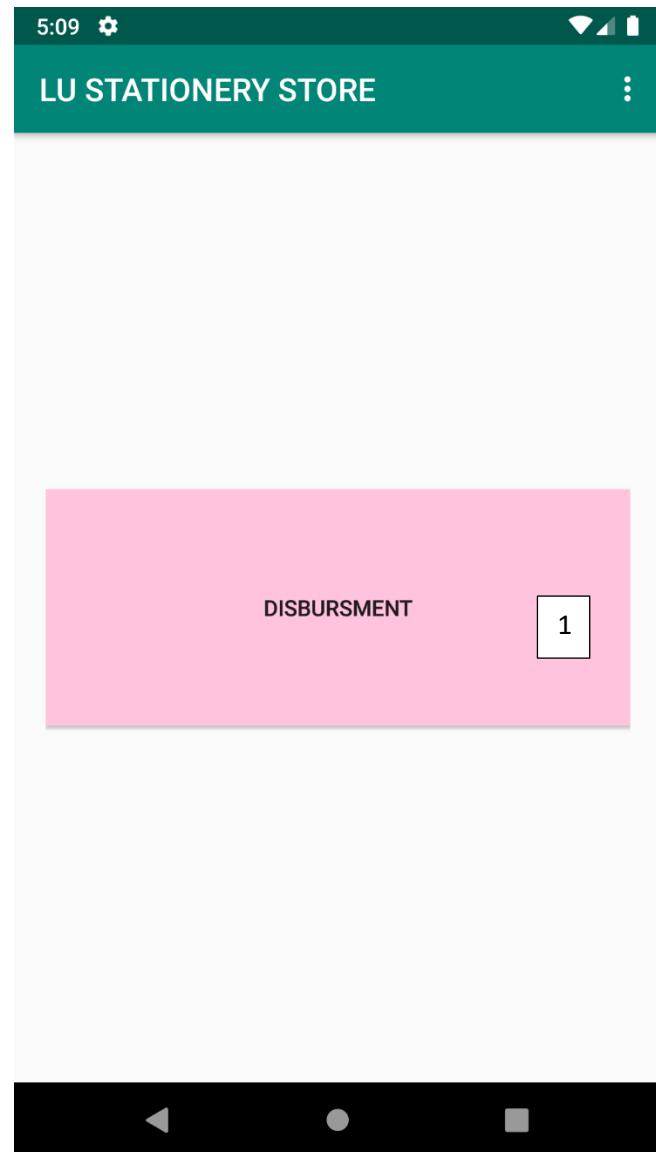
The final appointed staff details will be displayed in the screen which included Employee Name, The Start Date and End Date:

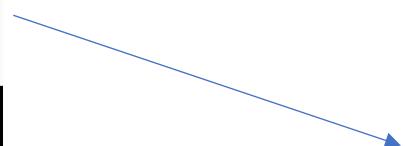
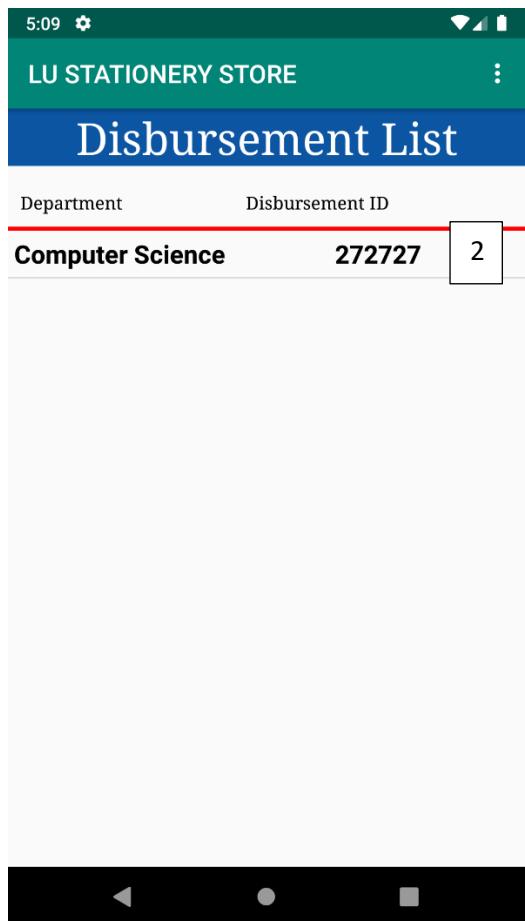


Mobile Features (Department Representative)

Once logged-in Department Representative can access his task

- 1) Click “Disbursement” button – to view all the disbursement titles
- 2) Click the name of the department to view the details of the disbursement list
- 3) Click the “Logout” button to logout from the screens





5:09 LU STATIONERY STORE Log Out

Disbursement Details

Department	Computer Science
Name	
Collection	NUS Business School
Point	
Representative	Alice
Name	
E-mail	abc@gmail.com

Item Code Stationery Description Required Qty Received Qty

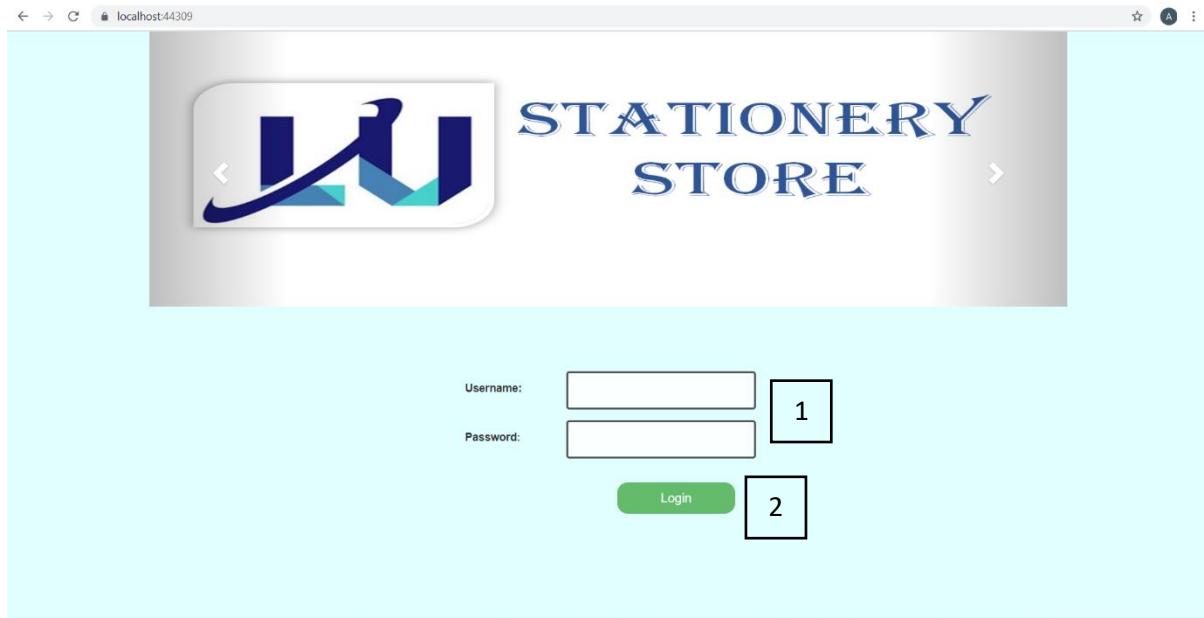
C001	Clips Double 1"	9	0
C002	Clips Double 2"	9	0
E001	Envelop Brown(3"x6")	27	0
E003	Envelop Brown(5"x7")	9	0
E020	Eraser(hard)	18	0

2.1.3.2. Store

Web Interface

LOGIN (GENERAL PAGE)

4. Enter your corporate username and password as assigned by your department.
5. Click on the “Login” button to enter the main page.



localhost:44309

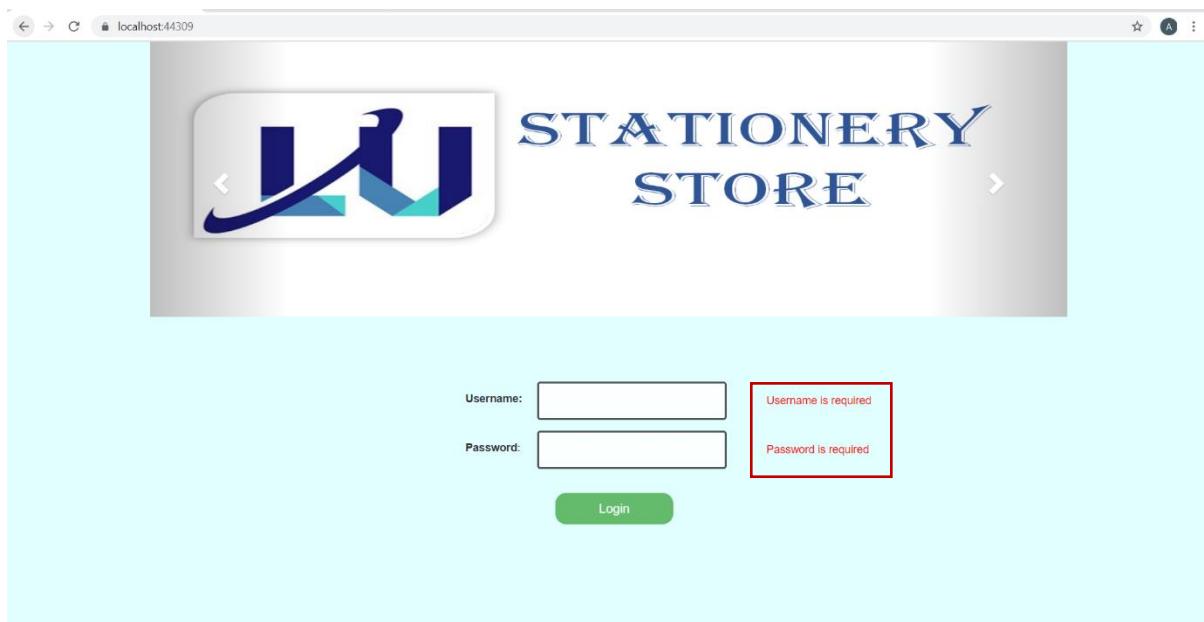
STATIONERY
STORE

Username: 1

Password: 2

Login

6. Both Username and Password is required to Login



localhost:44309

STATIONERY
STORE

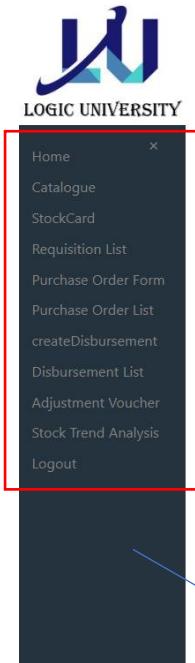
Username: Username is required

Password: Password is required

Login

Store Clerk

Store Clerk will see the following screen once logged in.

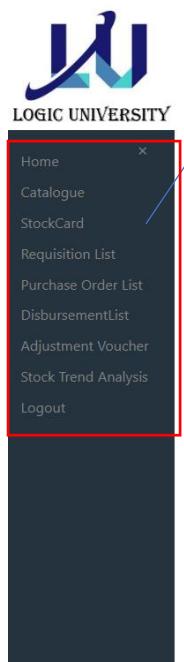


Welcome, SuSu!

Tasks that the staffs are authorised to do

Store Supervisor/Manager

Store Supervisor/ Manager will see the following screen once logged in.



Welcome, KyiPhyu!

The tasks that the staffs are authorised to do are:

- View **Stationery Catalogue** to view the stationery details and its' respective suppliers
- View **StockCard** details (incoming & outgoing of stock quantity and final stock level)
- View the **Requisition List** containing requisition forms that are approved by respective department heads
- Generate **Purchase Order Form** – **Clerk Only**
- View **Purchase Order List** showing history of the purchases made and their status
- Create the auto-generated **Disbursement** form- **Clerk Only**
- View details of **Disbursement List** - **Clerk Only**
- Create Discrepancy Form - **Clerk Only**
- View **Adjustment Voucher**
- Approve/ Reject Adjustment Voucher – **Manager/Supervisor Only**
- View **Stock Trend Analysis** Report
- Able to **Logout**

View Stationery Catalogue and Supplier details

- 1) Stationery Catalogue will display all the stationary items
- 2) Click "View" button to see the first three short-listed suppliers for a stationery

The screenshot shows a web application interface. At the top, there is a header bar with a logo, the text "Welcome, SuSu!", and a user profile picture. Below the header is a sidebar menu on the left with options like Home, Catalogue (which is highlighted with a red box), StockCard, Requisition List, Purchase Order Form, Purchase Order List, createDisbursement, Disbursement List, Adjustment Voucher, Stock Trend Analysis, and Logout. The main content area is titled "Stationery Catalogue". It contains a table with columns: Item ID, Item Name, and Unit Of Measure. Each row has a "View" button in the last column. The table data is as follows:

Item ID	Item Name	Unit Of Measure	
C001	Clips Double 1"	Dozen	<button>View</button>
C002	Clips Double 2"	Dozen	<button>View</button>
C003	Clips Double 3/4"	Dozen	<button>View</button>
C004	Clips Paper Large	Box	<button>View</button>
C005	Clips Paper Medium	Box	<button>View</button>
C006	Clips Paper Small	Box	<button>View</button>
E001	Envelop Brown(3"x6")	Each	<button>View</button>
E002	Envelop White(3"x6")	Each	<button>View</button>

A white box labeled "1" is around the "Catalogue" menu item in the sidebar. A white box labeled "2" is around the "View" button for the second item in the catalogue table.

The screenshot shows a web application interface. At the top, there is a header bar with a logo, the text "Welcome, SuSu!", and a user profile picture. Below the header is a sidebar menu on the left with options like Home, Catalogue, StockCard, Requisition List, Purchase Order Form, Purchase Order List, createDisbursement, Disbursement List, Adjustment Voucher, Stock Trend Analysis, and Logout. The main content area is titled "Supplier List". It contains a table with columns: Supplier ID and Supplier Name. The table data is as follows:

Supplier ID	Supplier Name
S001	ALPA Office Supplier
S003	BANES Shop
S004	OMEGA Stationery Suppl

An orange curly brace on the right side of the table is labeled "3 suppliers". A blue arrow points from the "Supplier List" heading down towards the table.

View Stock Card Details

- 1) StockCard will display all the stationary items
- 2) Click “Details” button to view the stock card details

The screenshot shows a web application window titled "My ASP.NET Application". The URL is "127.0.0.1:62062/StockCard/StockCardList". On the left, a sidebar menu has "StockCard" highlighted with a red box and the number "1". The main content area is titled "Stock Card List" and displays a table of items:

Item ID	Item Name	Details
C001	Clips Double 1"	Details
C002	Clips Double 2"	Details
C003	Clips Double 3/4"	Details
E001	Envelop Brown(3"x6")	Details
E002	Envelop White(3"x6")	Details
E003	Envelop Brown(5"x7")	Details
E020	Eraser(hard)	Details

A blue arrow points from the "StockCard" menu item in the sidebar to the "Details" button for item C001 in the table.

The screenshot shows a web application window titled "My ASP.NET Application". The URL is "127.0.0.1:62062/StockCard/StockCardDetail". On the left, a sidebar menu has "StockCard" highlighted with a red box and the number "1". The main content area is titled "Stock Card Detail" and displays item details and a transaction history table:

Item ID	C001	
Item Name	Clips Double 1"	
UOM	Dozen	
Category Name	Clip	
Department Name	Quantity	Balance
ALPA Office Supplier	10	10
English Dept	5	5
ALPA Office Supplier	100	105

Three callout boxes with arrows point to specific parts of the detail page:

- An arrow points from the "Incoming and outgoing stock quantity" callout to the "Quantity" column of the transaction history table.
- An arrow points from the "Final quantity of stock after latest transaction" callout to the "Balance" column of the transaction history table.
- An arrow points from the "Stationery Details" callout to the "Item ID" and "Item Name" fields in the detail section.

View Requisition List

- 1) Requisition List will display the all the requisition forms that are approved by respective department heads
- 2) Click “Details” button to view the Requisition Details

The screenshot shows the Logic University application interface. On the left, a vertical navigation menu lists various options: Home, Catalogue, StockCard, Requisition List (which is highlighted with a red box and labeled '1'), Purchase Order Form, Purchase Order List, createDisbursement, Disbursement List, Adjustment Voucher, Stock Trend Analysis, and Logout. The main content area is titled "Requisition List". It displays a table with two rows of data:

RequisitionID	DateOfSubmission	Department Code	Department Name
456554	2/12/2020 12:00:00 AM	D001	English Dept
456555	2/12/2020 12:00:00 AM	D002	Science Dept

Each row has a blue "Details" button to its right. A large blue arrow points from the "Requisition List" link in the navigation menu down to the "Details" button for the second row.

The screenshot shows the Logic University application interface. The navigation menu on the left is identical to the previous screenshot. The main content area is titled "Requisition Detail". It displays a table with three rows of data:

Item ID	Item Name	Requisition Qty
C001	Clips Double 1"	1
C002	Clips Double 2"	2
C003	Clips Double 3/4"	3

A large blue arrow points from the "Requisition List" link in the navigation menu down to the "Requisition Detail" page.

Generate Purchase Order Form

- 1) Input required details into the Purchase Order Form
- 2) Click “Create” button to generate the Purchase Order

My ASP.NET Application - 127.0.0.1:62062/Supplier/ViewPurchaseForm

Welcome, SuSu!

LOGIC UNIVERSITY

Home Catalogue StockCard Requisition List Purchase Order Form Purchase Order List createDisbursement Disbursement List Adjustment Voucher Stock Trend Analysis Logout

Purchase Order Form

DescriptionPurchase 1

SupplierID

ItemID

PurchaseOrderStatus

Quantity 2

Create

View Purchase Order List (History)

Purchase Order List shows the history of the details of the ordered stationeries

My ASP.NET Application - 127.0.0.1:62062/Supplier/PurchaseOrdersList

Welcome, SuSu!

LOGIC UNIVERSITY

Home Catalogue StockCard Requisition List Purchase Order Form Purchase Order List createDisbursement Disbursement List Adjustment Voucher Stock Trend Analysis Logout

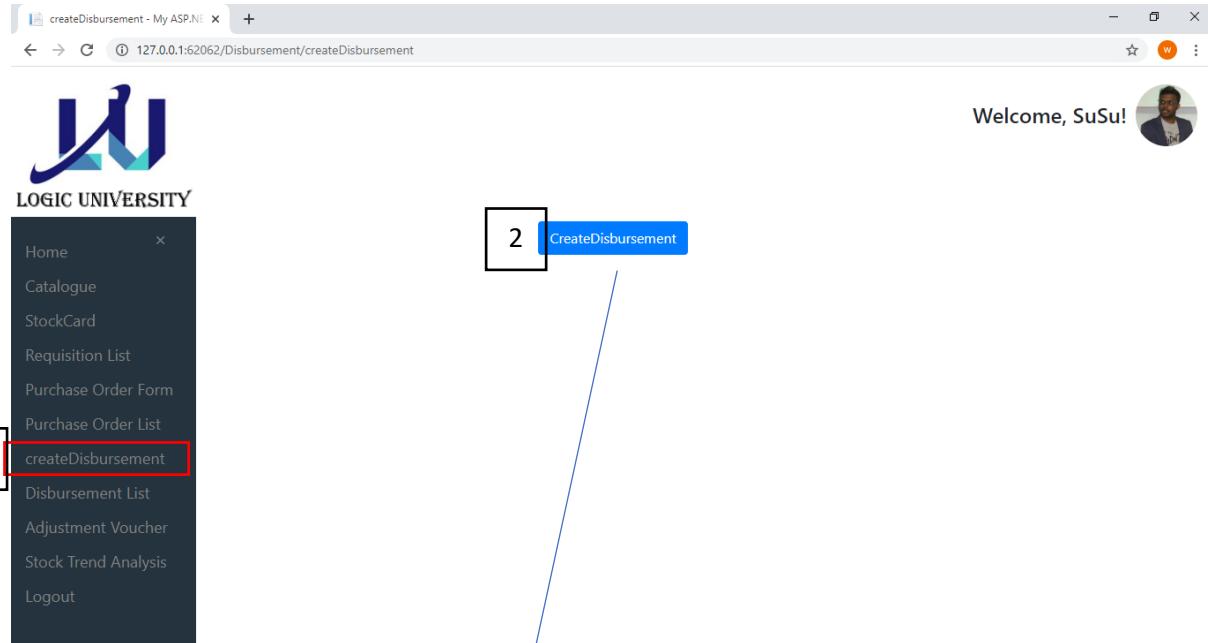
Purchase Order List

PurchaseOrderId	SupplierName	Item ID	Item Name	OrderQuantity
45	ALPA Office Supplier	C001	Clips Double 1"	100
46	ALPA Office Supplier	E020	Eraser(hard)	100
1045	Cheap Stationer	C001	Clips Double 1"	100
2045	ALPA Office Supplier	C001	Clips Double 1"	100

Purchase history

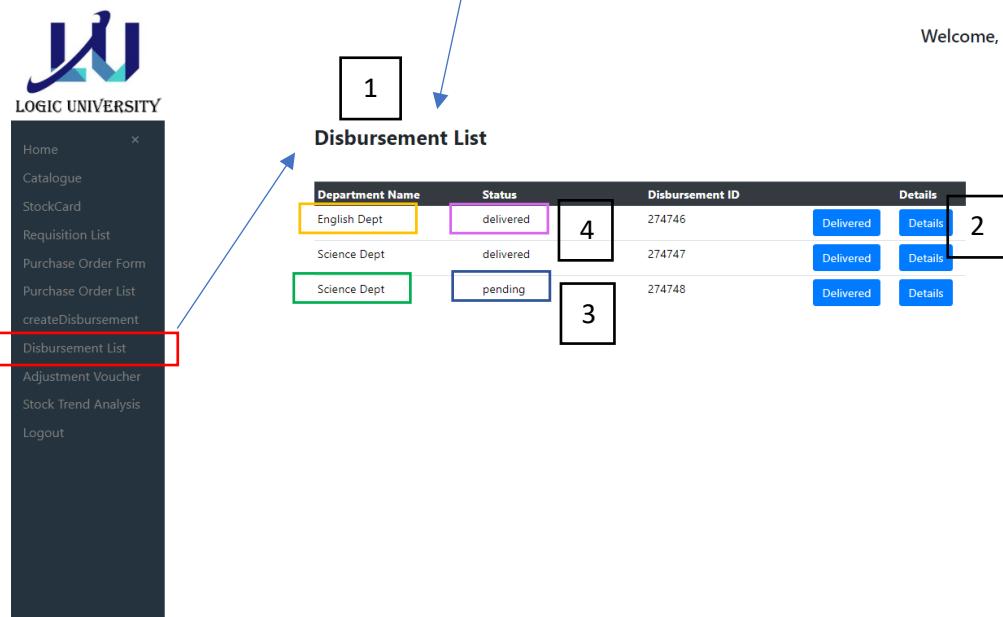
Create Disbursement Form

- 1) Click “CreateDisbursement” button to generate the disbursement forms which are grouped by departments
- 2) Users will be auto-directed to the Disbursement List page

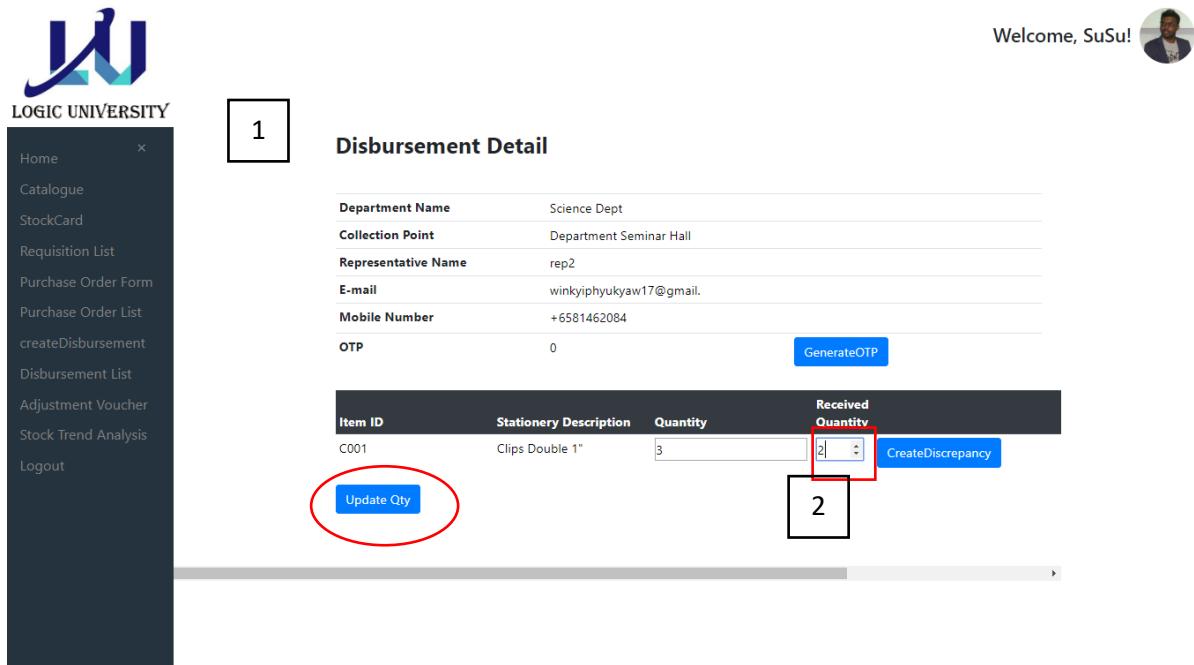


View details of Disbursement List

- 1) Disbursement List is auto-generated weekly by grouping requisition forms from the same department.
- 2) Click “Details” button to see the details of the stationery items requested by each department



- 1) Click the “Details” button to view the details of the disbursement form
If the status of disbursement form is pending, the clerk will be able to “Update Qty”
- 2) Key in the quantity received by the department representative in the “Received Quantity” column



1 **Disbursement Detail**

Department Name: Science Dept
Collection Point: Department Seminar Hall
Representative Name: rep2
E-mail: winkyiphuyukyaw17@gmail.com
Mobile Number: +6581462084
OTP: 0 GenerateOTP

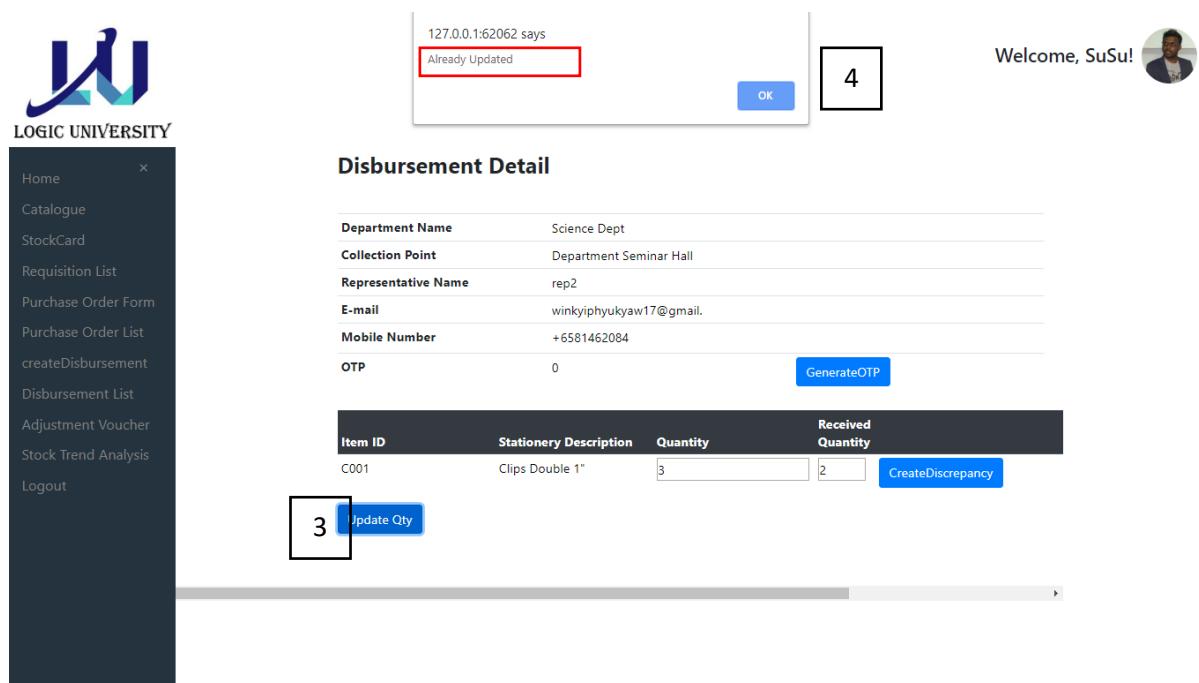
Item ID	Stationery Description	Quantity	Received Quantity
C001	Clips Double 1"	3	2

2 CreateDiscrepancy

3 Update Qty

Welcome, SuSu! 

- 3) Click “Update Qty” button to save the data into the database
- 4) Pop-up alert will be displayed to confirm the update of “received quantity”



4 **Disbursement Detail**

Department Name: Science Dept
Collection Point: Department Seminar Hall
Representative Name: rep2
E-mail: winkyiphuyukyaw17@gmail.com
Mobile Number: +6581462084
OTP: 0 GenerateOTP

Item ID	Stationery Description	Quantity	Received Quantity
C001	Clips Double 1"	3	2

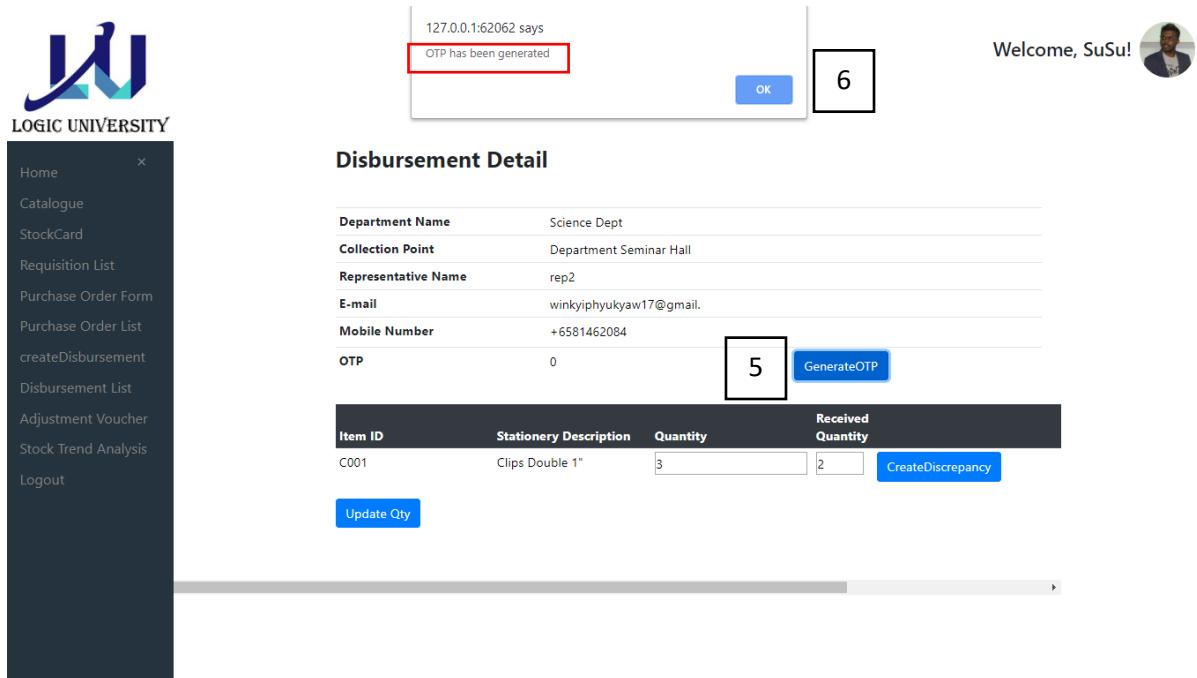
3 Update Qty

127.0.0.1:62062 says
Already Updated

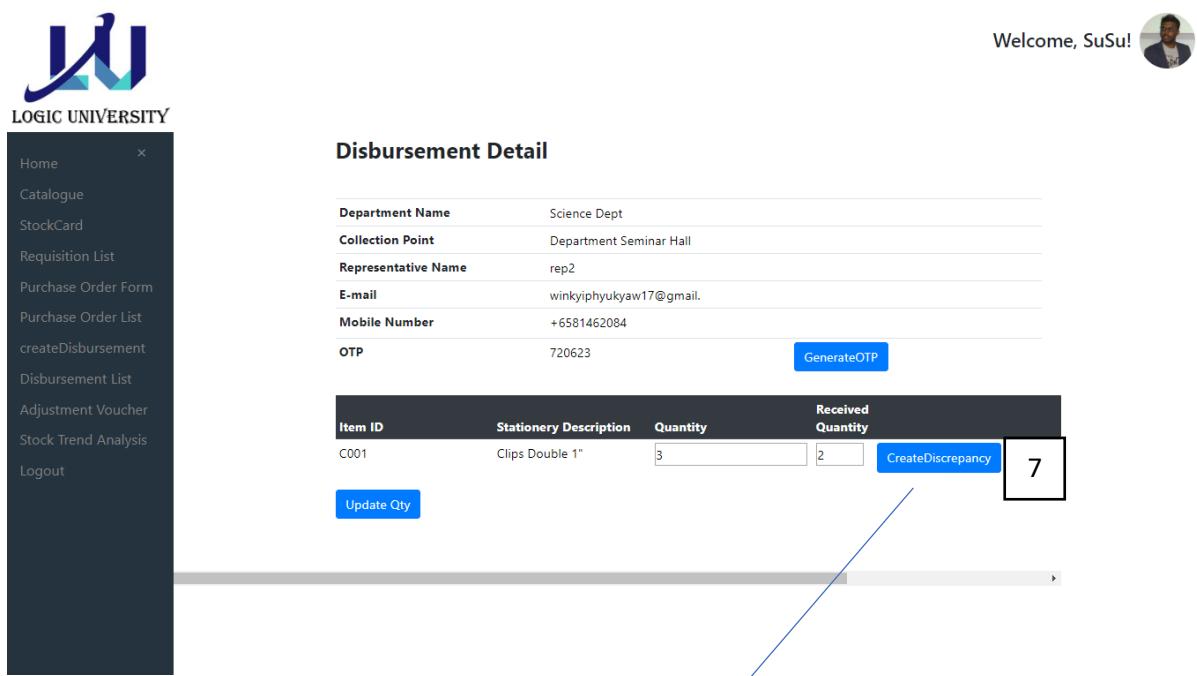
OK

Welcome, SuSu! 

- 5) Click “GenerateOTP” Button
- 6) Pop-up alert will be displayed to confirm the generation of OTP



The screenshot shows the Disbursement Detail page of the Logic University system. On the left is a sidebar with navigation links: Home, Catalogue, StockCard, Requisition List, Purchase Order Form, Purchase Order List, createDisbursement, Disbursement List, Adjustment Voucher, Stock Trend Analysis, and Logout. The main content area has a title "Disbursement Detail". Below it is a table with columns: Department Name (Science Dept), Collection Point (Department Seminar Hall), Representative Name (rep2), E-mail (winkyiphyukyaw17@gmail.com), Mobile Number (+6581462084), and OTP (0). A blue button labeled "GenerateOTP" is visible. A red box highlights the message "OTP has been generated" in a confirmation dialog box. A blue arrow points from this dialog to a numbered callout "6" located to the right. At the top right, there is a welcome message "Welcome, SuSu!" next to a user profile icon.



This screenshot shows the same Disbursement Detail page after the OTP has been generated. The OTP field now contains "720623". A blue arrow points from the "CreateDiscrepancy" button in the table row to a numbered callout "7" located to the right. The rest of the interface is identical to the previous screenshot, including the sidebar and the overall layout.

- 7) Click “CreateDiscrepancy” to create a discrepancy form

- 8) Type the reason for the discrepancy
- 9) Click the "Submit Button"

Welcome, SuSu! 

Raise Discrepancy

Disbursement ID:	274748
Item ID:	C001
Quantity They want:	3
Discrepancy Quantity:	2
Reason:	missing

Submit

Type in the reason for raising discrepancy

Discrepancy Form will be saved into Data-Base and the page will be redirected to Disbursement List

- 10) Click the "Delivered" Button to change the status of the Disbursement List

Welcome, SuSu! 

Disbursement List

Department Name	Status	Disbursement ID	Details
English Dept	delivered	274746	Delivered Details
Science Dept	delivered	274747	Delivered Details
Science Dept	pending	274748	Delivered Details

10



LOGIC UNIVERSITY

Home x
Catalogue
StockCard
Requisition List
Purchase Order Form
Purchase Order List
createDisbursement
Disbursement List
Adjustment Voucher
Stock Trend Analysis
Logout

Disbursement List

Department Name	Status	Disbursement ID	Details
English Dept	delivered	274746	<button>Delivered</button> <button>Details</button>
Science Dept	delivered	274747	<button>Delivered</button> <button>Details</button>
Science Dept	delivered	274748	<button>Delivered</button> <button>Details</button>

Welcome, SuSu!



Click again

- 11) If the disbursement status is “delivered”, the “Update Qty” button will no longer be visible



LOGIC UNIVERSITY

Home x
Catalogue
StockCard
Requisition List
Purchase Order Form
Purchase Order List
createDisbursement
Disbursement List
Adjustment Voucher
Stock Trend Analysis
Logout

Disbursement Detail

Department Name	Science Dept
Collection Point	Department Seminar Hall
Representative Name	rep2
E-mail	winkyiphuyukyaw17@gmail.
Mobile Number	+6581462084
OTP	720623

GenerateOTP

Welcome, SuSu!



Item ID	Stationery Description	Quantity	Received Quantity	
C001	Clips Double 1"	3 <input type="text"/>	2 <input type="text"/>	<button>CreateDiscrepancy</button>



View Adjustment Voucher

The screenshot shows a web application interface for viewing adjustment vouchers. At the top, there's a header bar with a logo for 'LOGIC UNIVERSITY', a welcome message 'Welcome, SuSu!', and a user profile icon. Below the header is a navigation menu on the left with links like Home, Catalogue, StockCard, Requisition List, Purchase Order Form, Purchase Order List, createDisbursement, Disbursement List, Adjustment Voucher (which is highlighted with a red box), Stock Trend Analysis, and Logout. The main content area is titled 'Adjustment List' and contains a table with the following data:

Item ID	Item Name	Discrepancy Qty	Reason	DiscrepancyStatus
C001	Clips Double 1"	4	Some broke	approved
C003	Clips Double 3/4"	6		approved
C001	Clips Double 1"	8		PendingForApproval
C001	Clips Double 1"	4		PendingForApproval
C002	Clips Double 2"	1	Some broke	PendingForApproval
C003	Clips Double 3/4"	2	missing	PendingForApproval

View Stock Trend Analysis Report

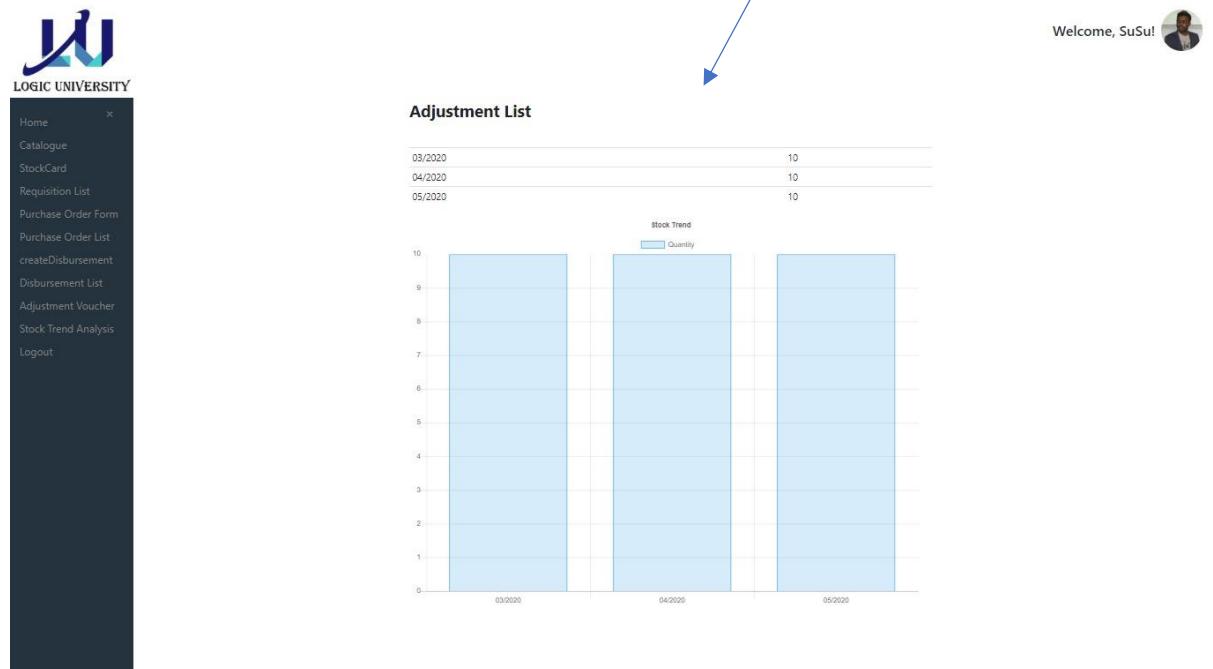
This function is to view the dashboard which analyses the stock trend. Stock users can select the particular item required by particular department and then predict the next 3 month's quantity of the item that department may require.

- 1) Select category of the stationery wanting to analyse and predict

The screenshot shows a web application interface for stock trend analysis. At the top, there's a header bar with a logo for 'LOGIC UNIVERSITY', a welcome message 'Welcome, SuSu!', and a user profile icon. Below the header is a navigation menu on the left with links like Home, Catalogue, StockCard, Requisition List, Purchase Order Form, Purchase Order List, createDisbursement, Disbursement List, Adjustment Voucher (which is highlighted with a red box), Stock Trend Analysis (which is also highlighted with a red box), and Logout. The main content area is titled 'StockTrendAnalysis' and contains a form with the following fields:
Category :
Department :
A dropdown menu for Department is open, showing options: Clip, Envelope, Pot, and Eraser.
A blue button labeled 'Predict Forward 3 Months' is visible.

- 2) Select department wanting to predict
- 3) Click “Predict Forward 3 Months” and the system will generate the predicted trend diagram

The screenshot shows the 'StockTrendAnalysis' page. On the left is a sidebar with links: Home, Catalogue, StockCard, Requisition List, Purchase Order Form, Purchase Order List, createDisbursement, Disbursement List, Adjustment Voucher, Stock Trend Analysis, and Logout. The main area has a title 'StockTrendAnalysis'. Below it are two dropdown menus: 'Category : Clip' and 'Department :'. The 'Department' dropdown is open, showing options: English Dept, English Dept, Science Dept (which is selected), and Stationery Store. A large blue arrow points from the 'Science Dept' option in the dropdown to a blue button labeled 'Predict Forward 3 Months'.



Exclusive Store Manager/ Store Supervisor Features

Manager Adjustment Voucher - Approve/Reject

Welcome, yha! 

Adjustment List

Item Name	Discrepancy Qty	Reason	DiscrepancyStatus	Amount	Action
Clips Double 1"	4	Some broke	approved	40	Approve Reject
Clips Double 3/4"	6		approved	180	Approve Reject
Clips Double 1"	8		PendingForApproval	80	Approve Reject
Clips Double 1"	4		PendingForApproval	40	Approve Reject
Clips Double 2"	1	Some broke	PendingForApproval	20	Approve Reject
Clips Double 3/4"	200	missing	PendingForApproval	6000	Approve Reject

Supervisor Adjustment Voucher - Approve/Reject/Pass to Manager

Welcome, KyiPhyu! 

Adjustment List

Item Name	Discrepancy Qty	Reason	DiscrepancyStatus	Amount	Action
Clips Double 1"	4	Some broke	approved	40	Approve Reject PassToMgr
Clips Double 3/4"	6		approved	180	Approve Reject PassToMgr
Clips Double 1"	8		PendingForApproval	80	Approve Reject PassToMgr
Clips Double 1"	4		PendingForApproval	40	Approve Reject PassToMgr
Clips Double 2"	250	Some broke	PendingForApproval	5000	Approve Reject PassToMgr
Clips Double 3/4"	200	missing	PendingForApproval	6000	Approve Reject PassToMgr

Welcome, KyiPhyu!

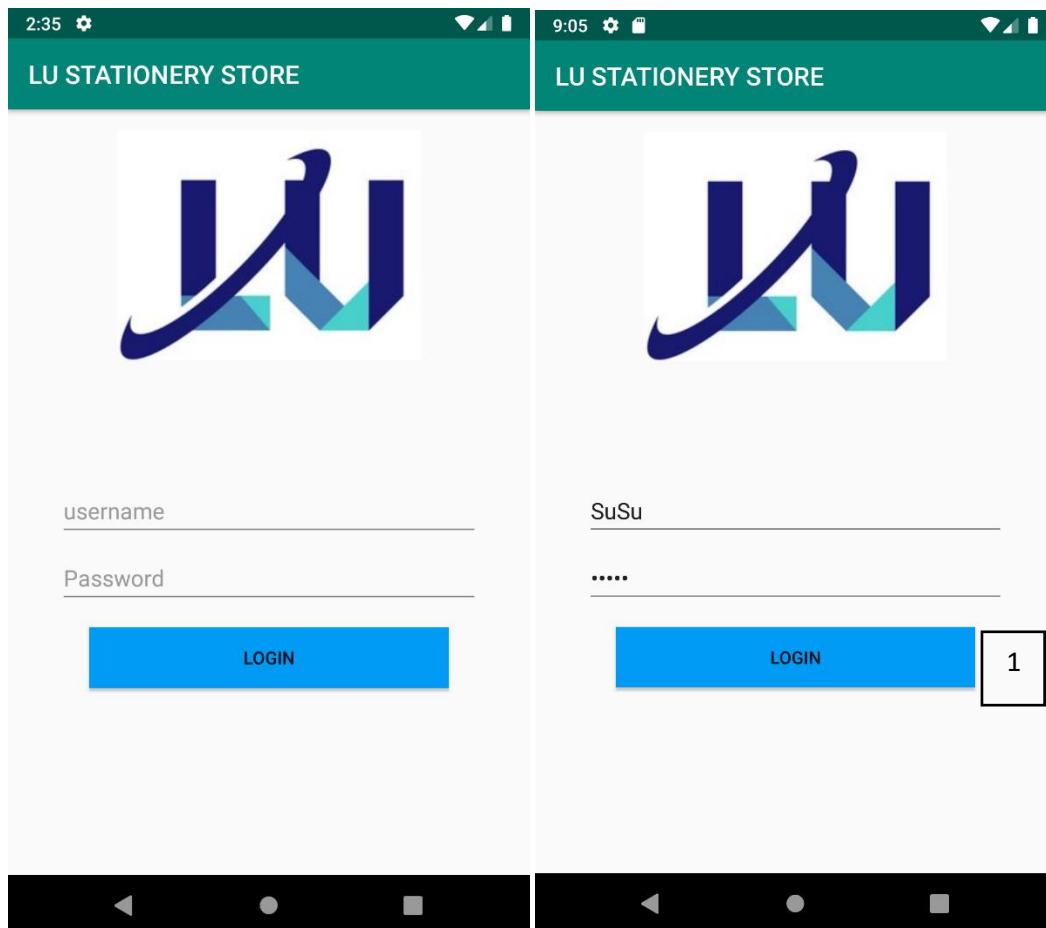


Amount	Approve	Reject	PassToMgr
40	Approve	Reject	PassToMgr
180	Approve	Reject	PassToMgr
80	Approve	Reject	PassToMgr
40	Approve	Reject	PassToMgr
5000	Approve	Reject	PassToMgr
6000	Approve	Reject	PassToMgr

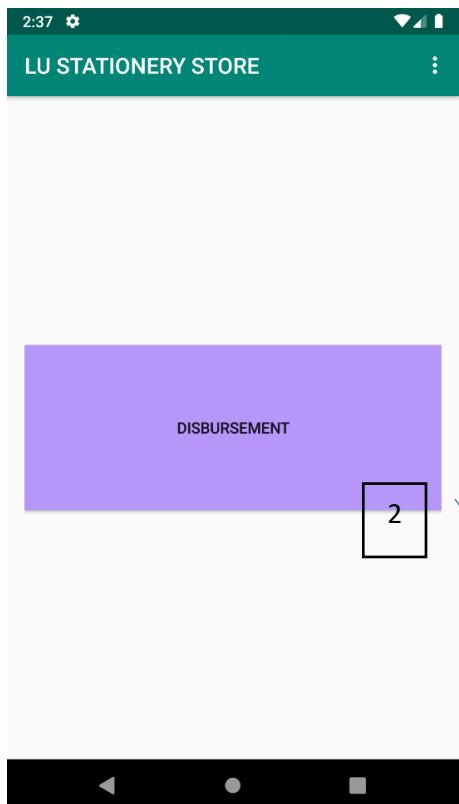


Android Interface

- 1) Login: The mobile end can only be accessed by store clerk from store side, store supervisor or manager cannot use the mobile end.



- 2) After login, system will show the home page which have the “DISBURSEMENT” button. Click the button and clerk will be able to see the disbursement list.
- 3) After selecting the disbursement form they want , the page will show disbursement details.



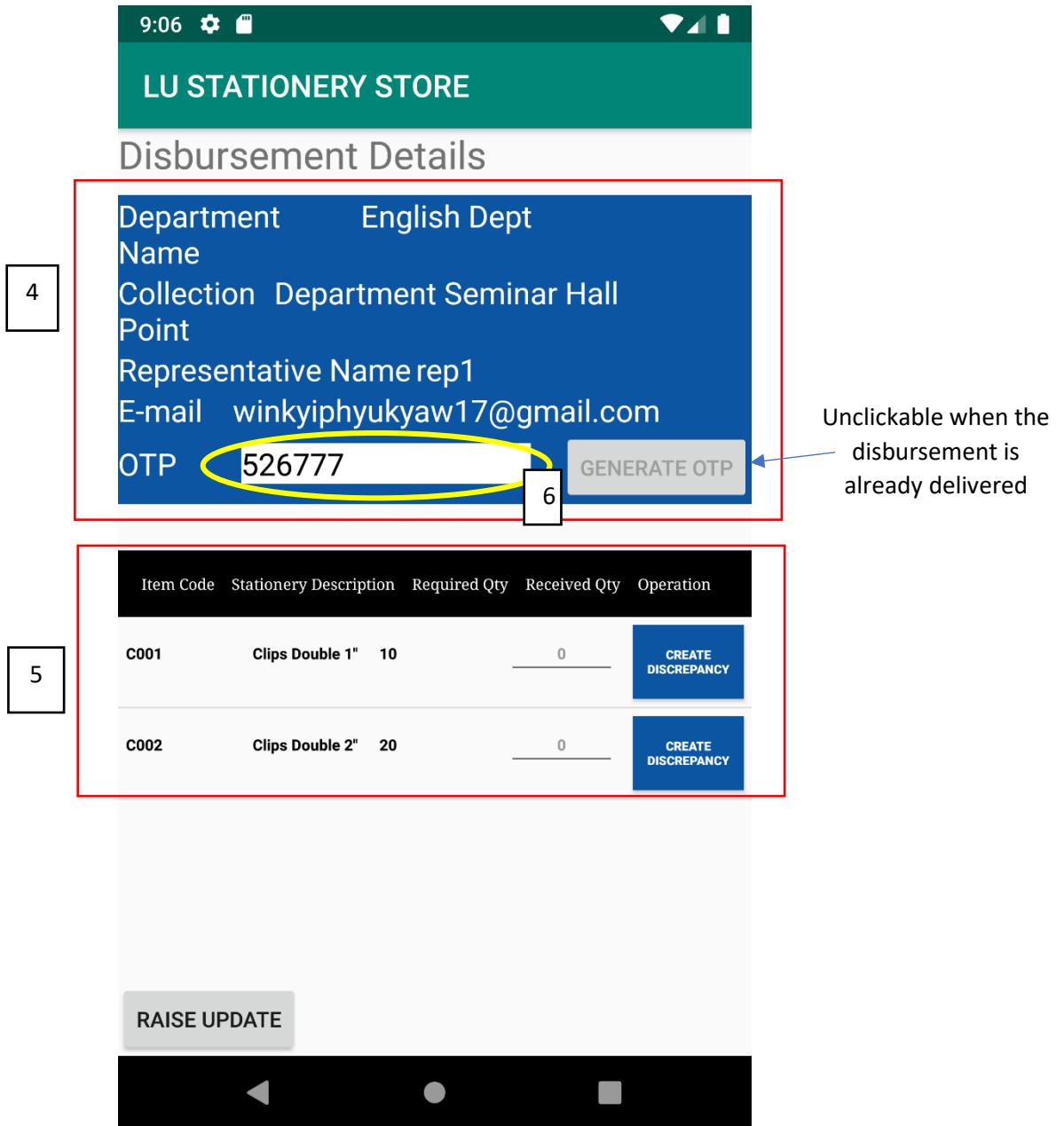
A screenshot of a mobile application showing a list titled "Disbursement List". The screen has a green header bar with "LU STATIONERY STORE" and three vertical dots. Below the header is a blue bar with the title "Disbursement List". The main content is a table with two rows:

Department	Disbursement ID
English Dept	274754
Science Dept	274755

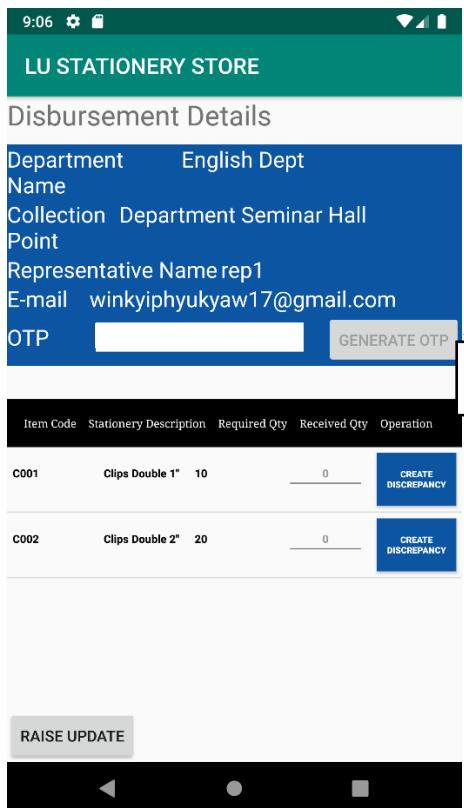
At the bottom is a black navigation bar with three white icons: a left arrow, a circle, and a square. A blue arrow points from the number "2" in the first screenshot to the "Disbursement List" table in the second screenshot.

- 4) The disbursement detail page will show department name, collection point, representative name, representative's email and OTP on the top,
- 5) There will also be a list showing the item code, stationery description required Qty, received Qty

- 6) If the disbursement is **already delivered**, then the OTP number will directly exist and display in details. And the “GENERATE OTP” button will be unclickable.

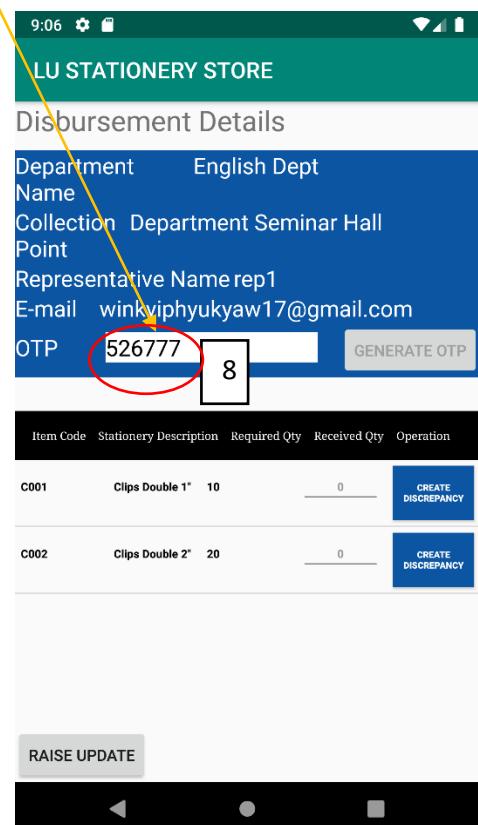


- 7) If the status of this disbursement is **pending**, clerk will need to click the “GENERATE OTP” button and department rep will receive an OTP number from the contact email.
- 8) After the clerk clicks the GENERATE OTP button, the OTP will also display in the form automatically. Clerk will ask the representative to provide the OTP and if the OTP is the same, then it proves representative’s identity.



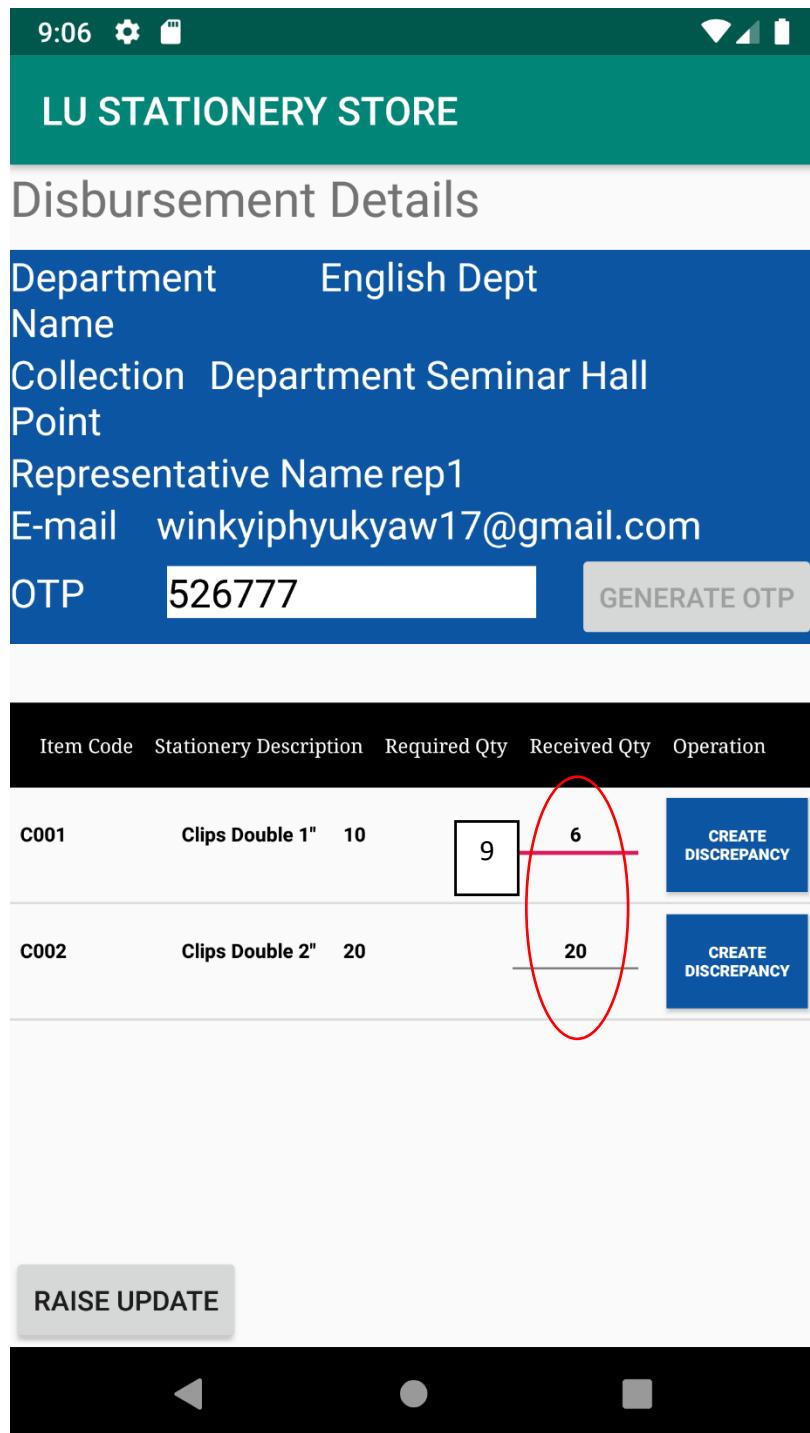
Click to generate OTP

7

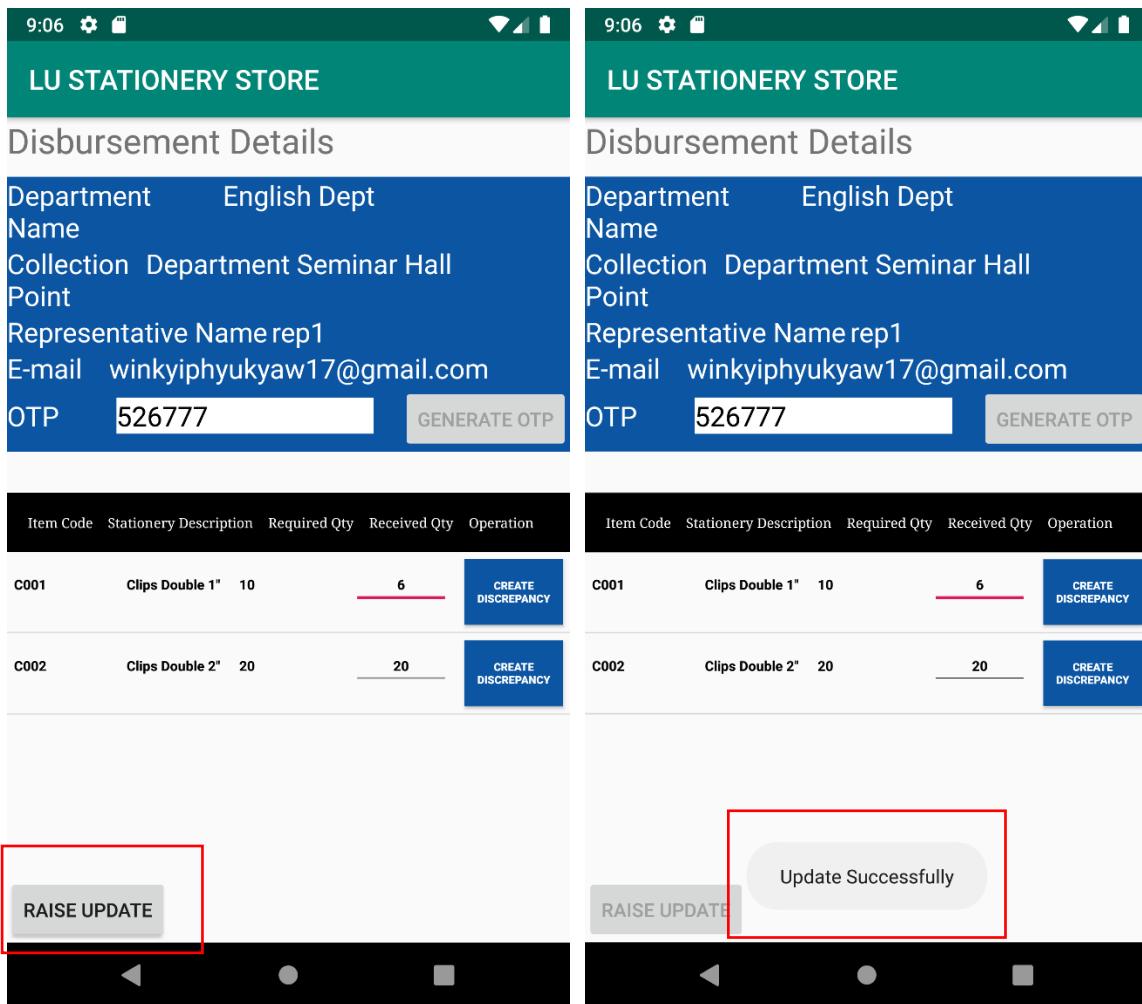


8

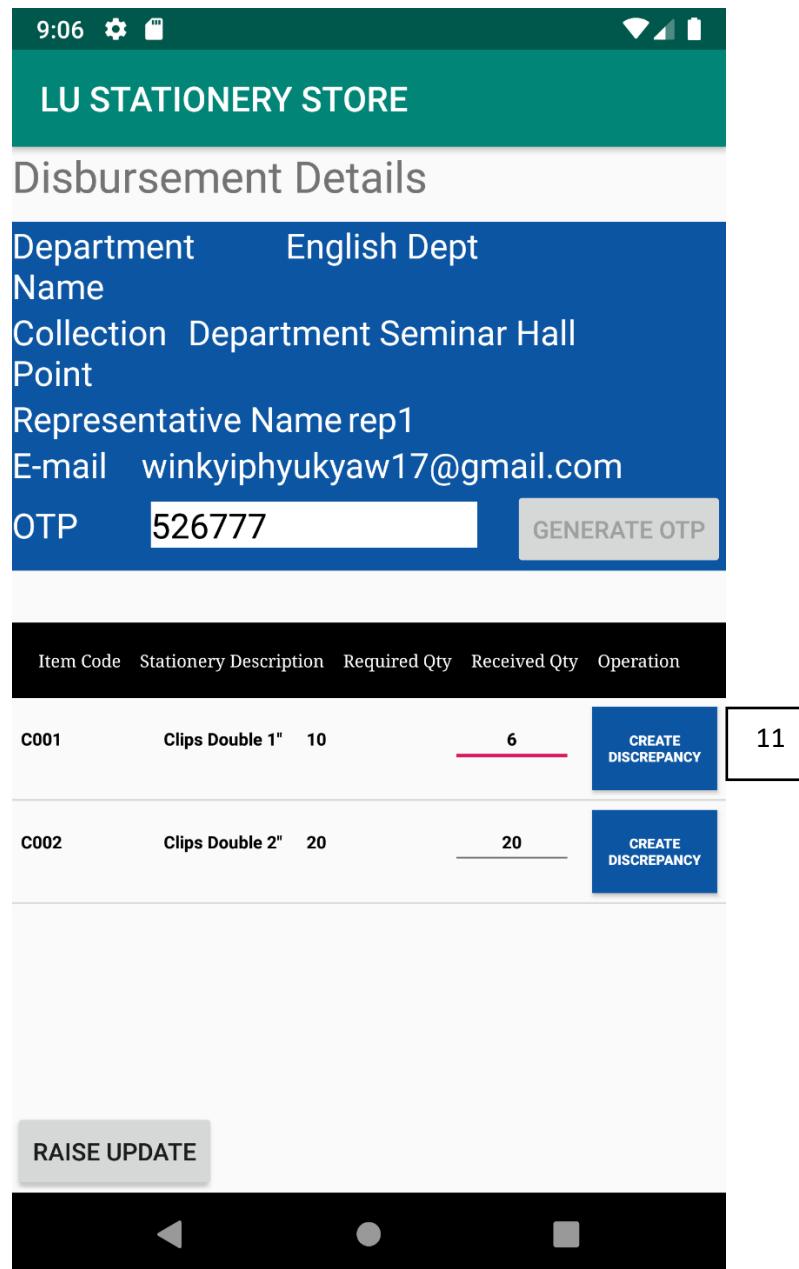
- 9) Clerk will type in the actual received Qty given to that department rep



- 10) After that, clerk should press “RAISE UPDATE” button and the received Qty will be recorded into database and show “Update successfully” message

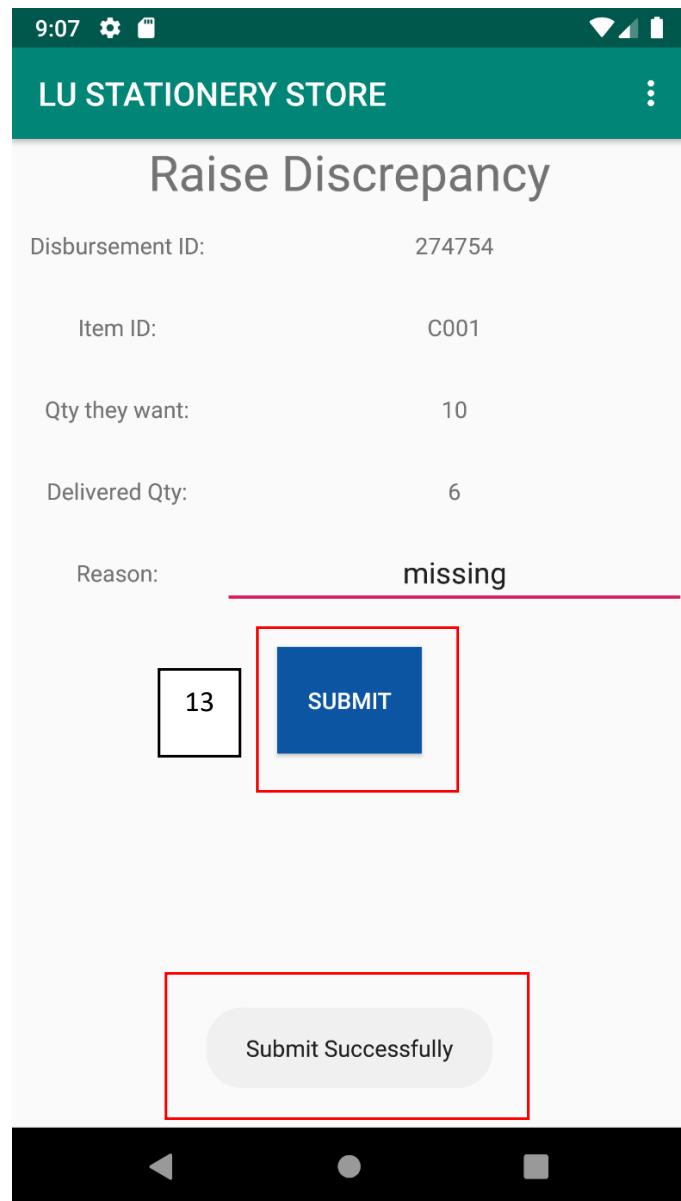


- 11) If there is any discrepancy for any item's disbursement, then clerk can create discrepancy form by pressing the "CREATE DISCREPANCY" button.



- 12) It will go to the “Raise Discrepancy” page. The discrepancy form will show the information of disbursement ID, item ID, required Qty and actual received qty, clerk only need to input the reason why there is a discrepancy and submit to server.

LU STATIONERY STORE		LU STATIONERY STORE	
Raise Discrepancy			
Disbursement ID:	274754	Disbursement ID:	274754
Item ID:	C001	Item ID:	C001
Qty they want:	10	Qty they want:	10
Delivered Qty:	6	Delivered Qty:	6
Reason:	<input type="text" value="12 missing"/>		
<input type="button" value="SUBMIT"/>		<input type="button" value="SUBMIT"/>	

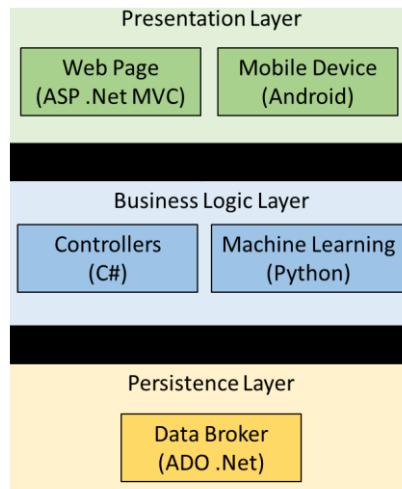


- 13) Then redo the operation until all the discrepancy forms have been raised.
- 14) If there is no other issues, clerk can log out and app will return to the login page.

2.2. DESIGN WORKFLOW(DESIGN MODELS)

ARCHITECTURAL PLATFORM

The software architecture design of this project is depicted in the following diagram.

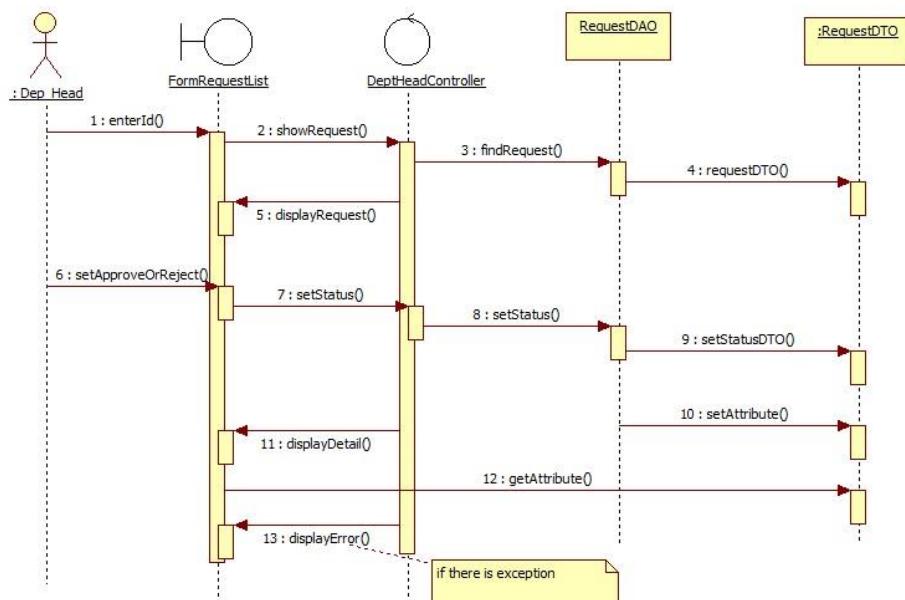


A 3-tier architecture is chosen over a 2-tier architecture. 3-tier architecture has high performance and lightweight persistent objects. Because the presentation tier can cache requests, network utilization is minimized, and the load is reduced on the application and data tiers. It also has high degree of flexibility in deployment platform and configuration and improved security because client is not directly accessible to database. It's easy to maintain, modification is comparatively easier and it won't affect other modules. In three tier architecture, application performance is good. The features of this solution are mainly accessed through web page. ASP .Net MVC is chosen as the main technology for this project as it is relatively easier to implement and maintain, and team members are more familiar with it.

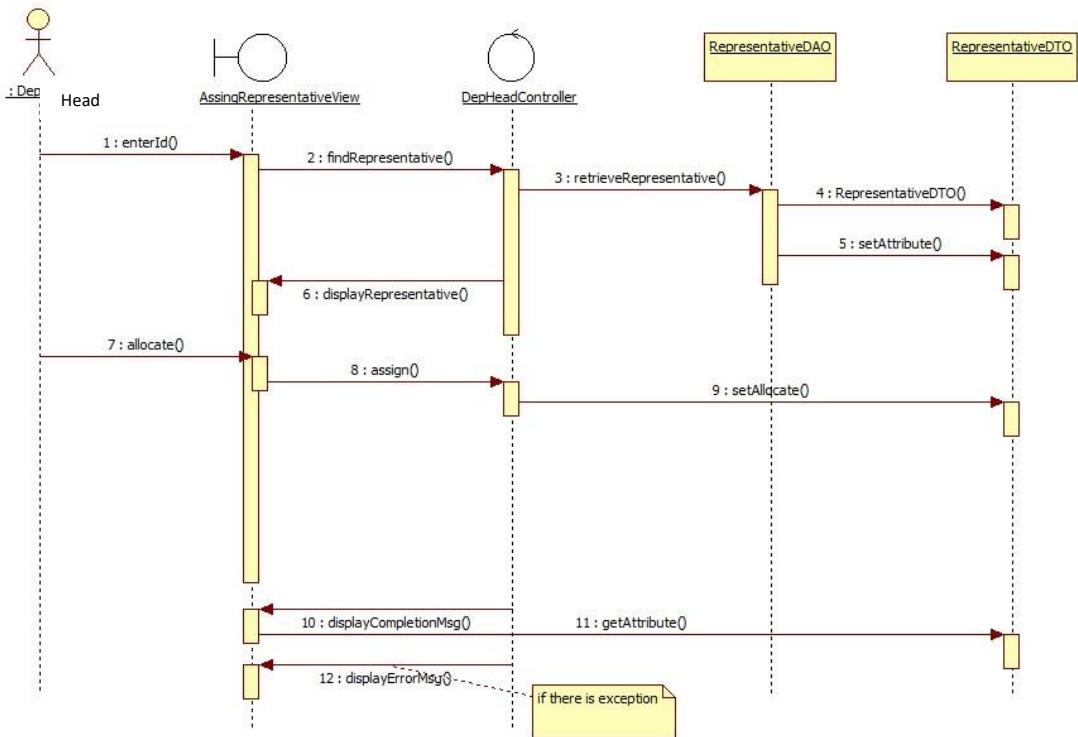
FINAL DESIGN SEQUENCE DIAGRAM

For department

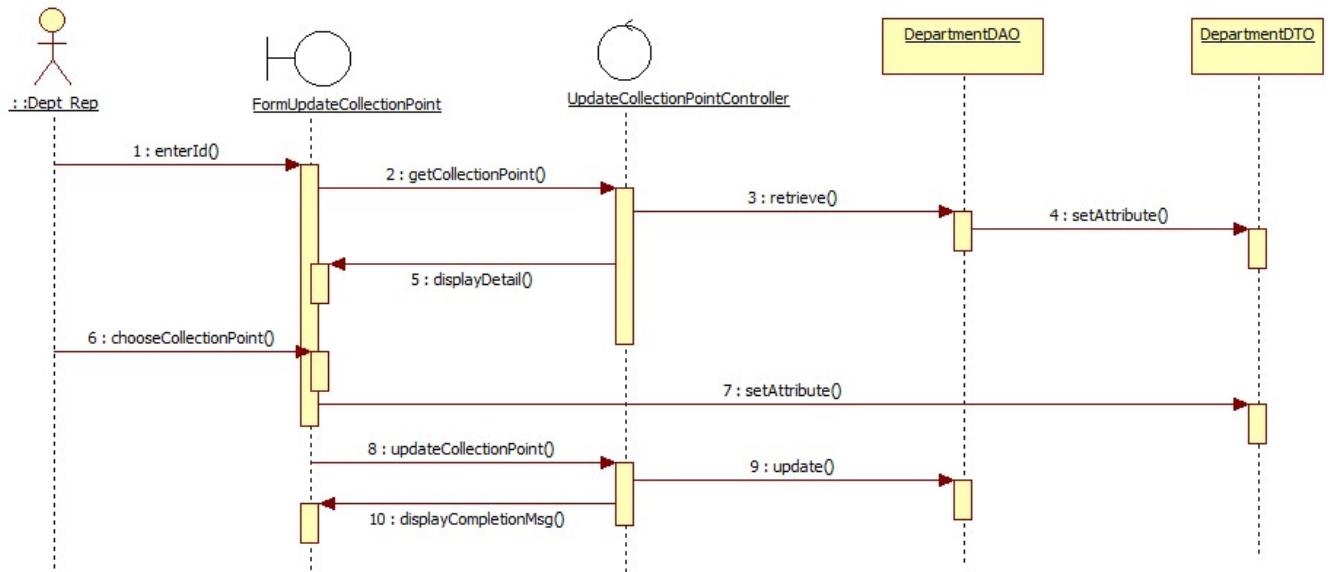
- Dep Head approve or reject requisition form



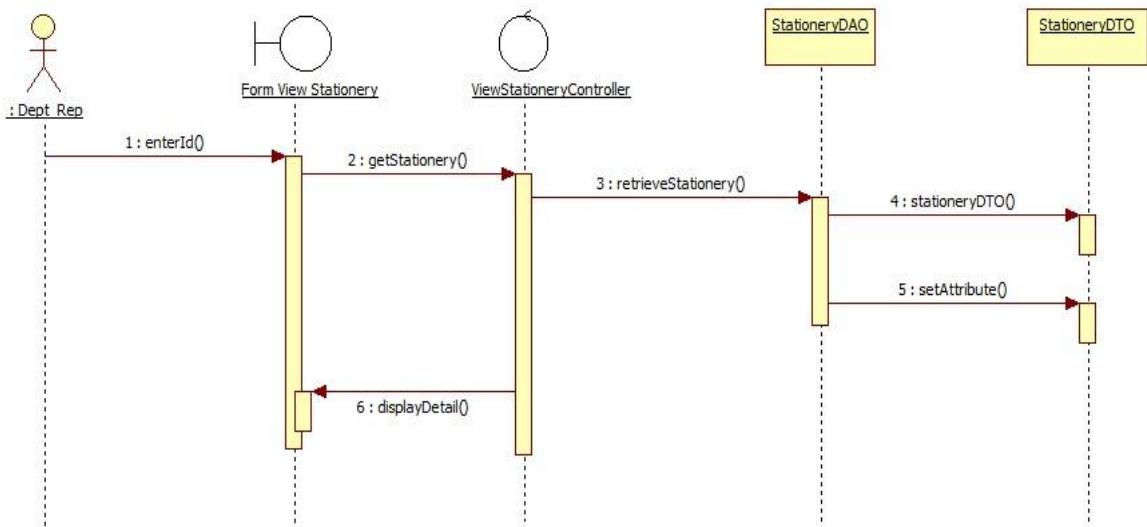
- Dep Head assign representative



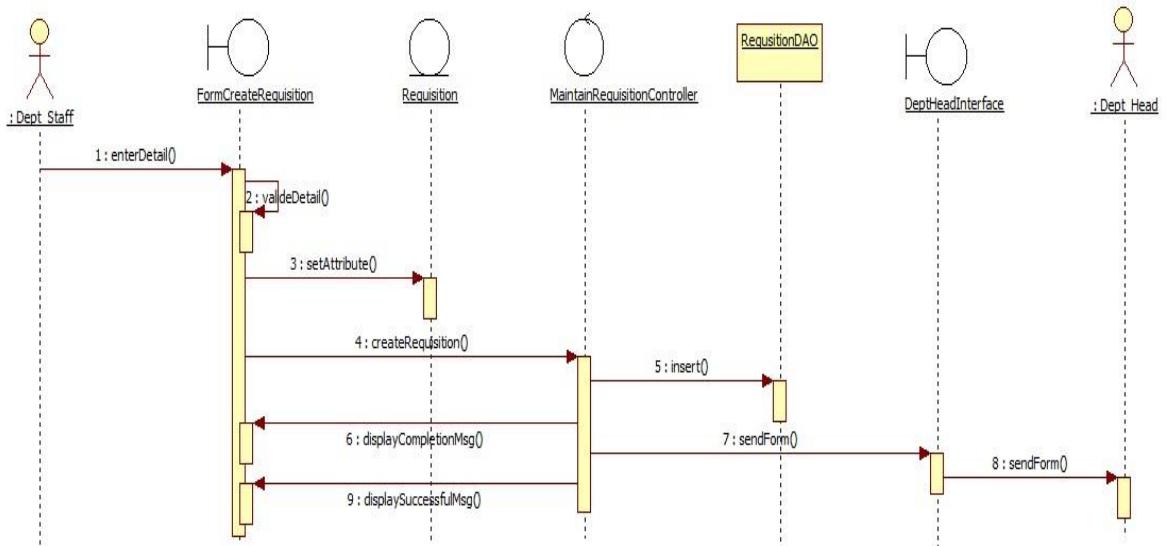
- Dep Rep update collection point



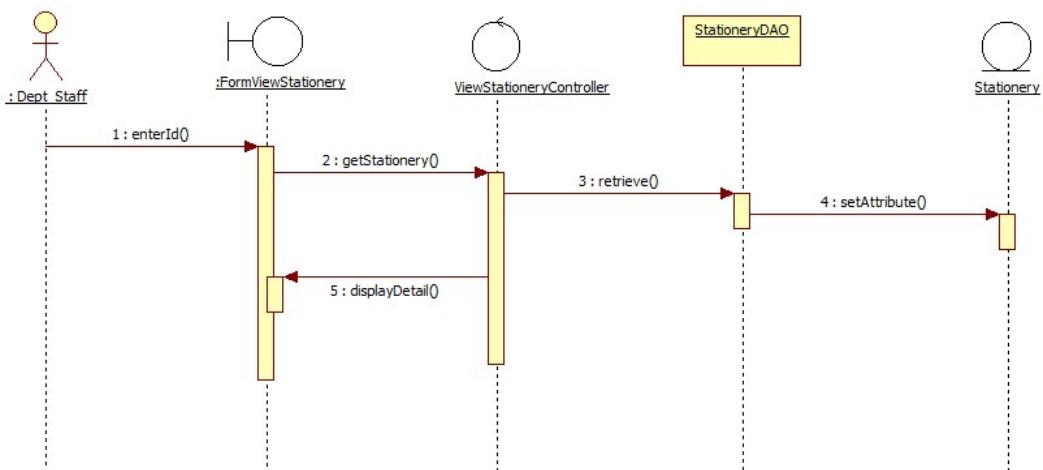
- Dep Rep view stationery catalogue



- Dep Staff raise requisition form

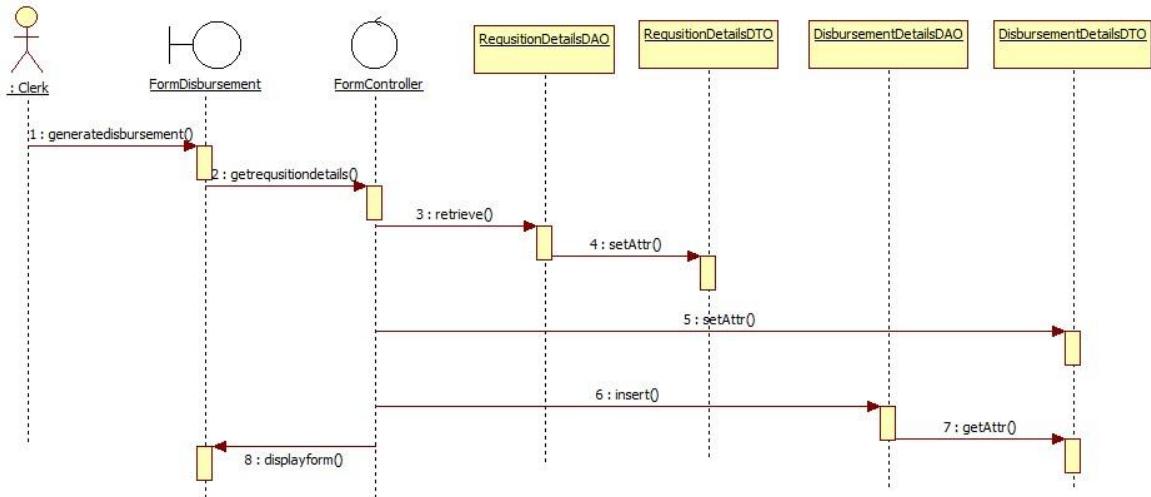


- Dep Staff view stationery catalogue

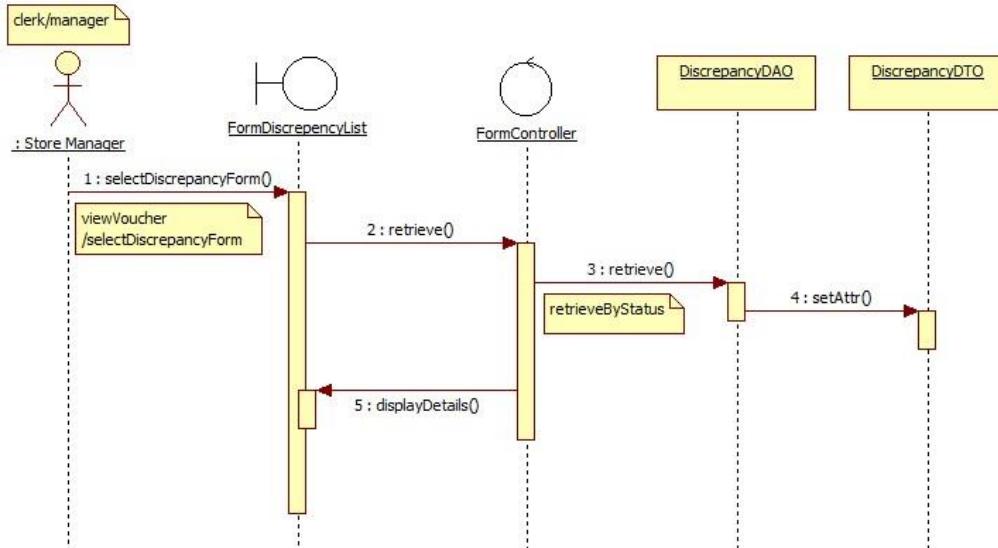


For Store Side

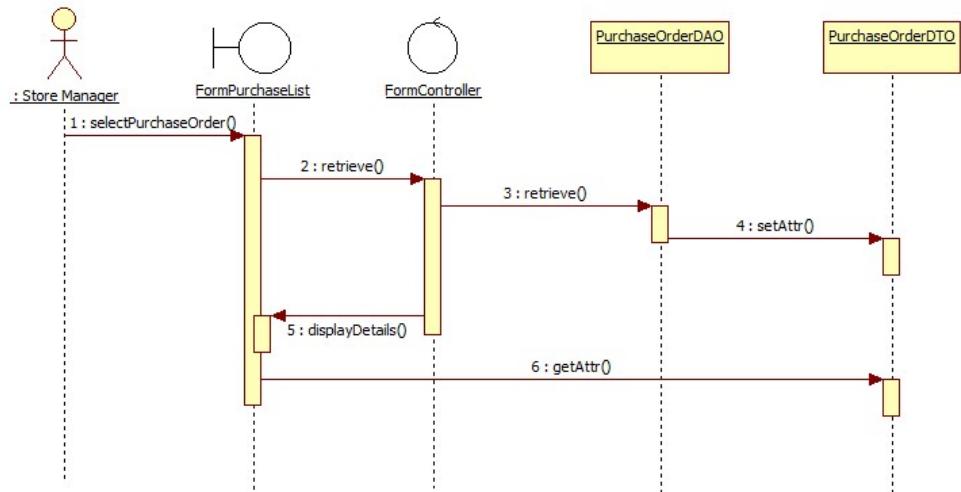
- Store Clerk create disbursement form



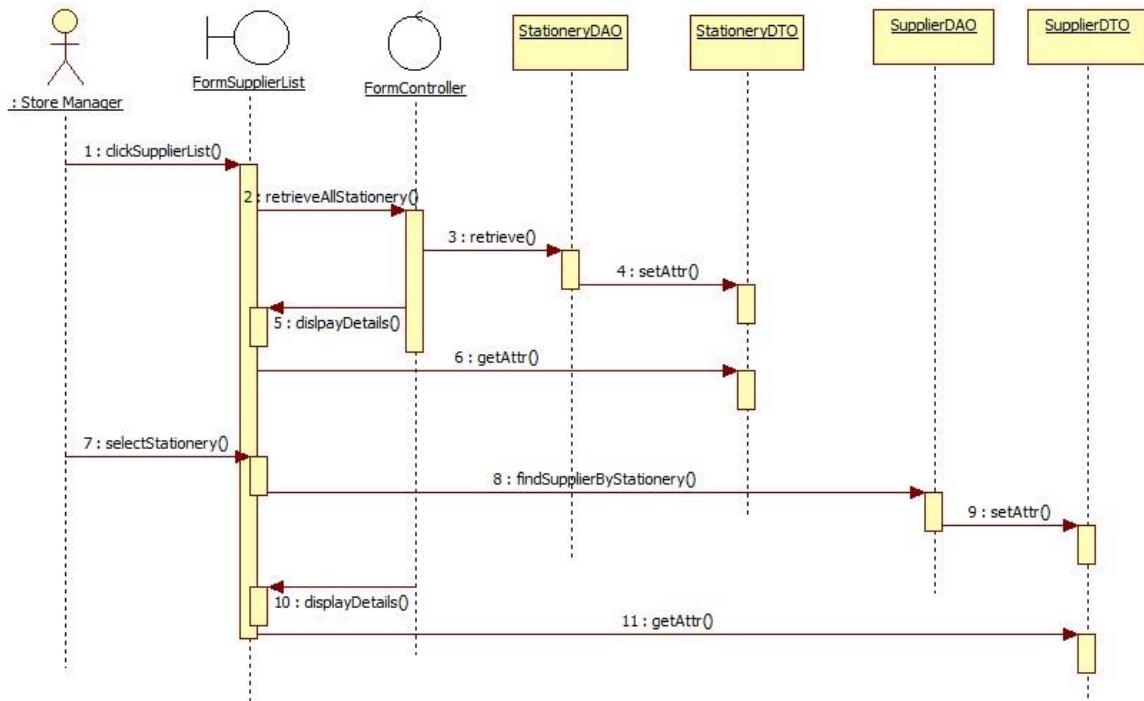
- Clerk /manager view the discrepancy form



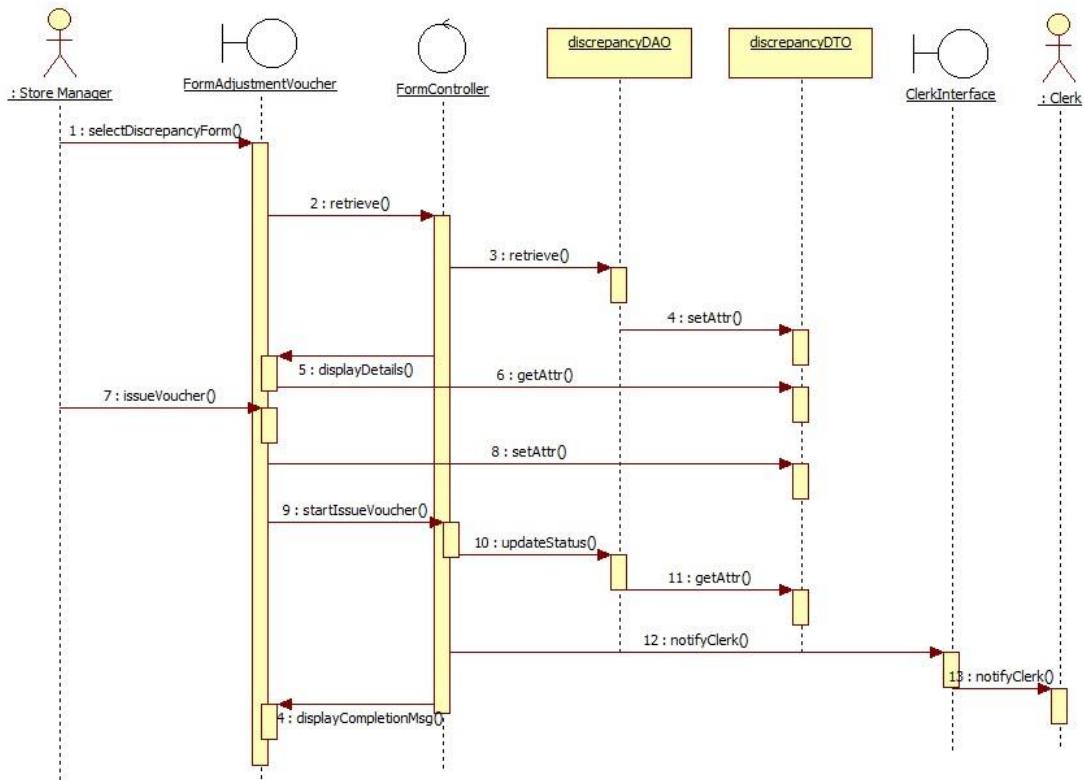
- Manager view purchase order



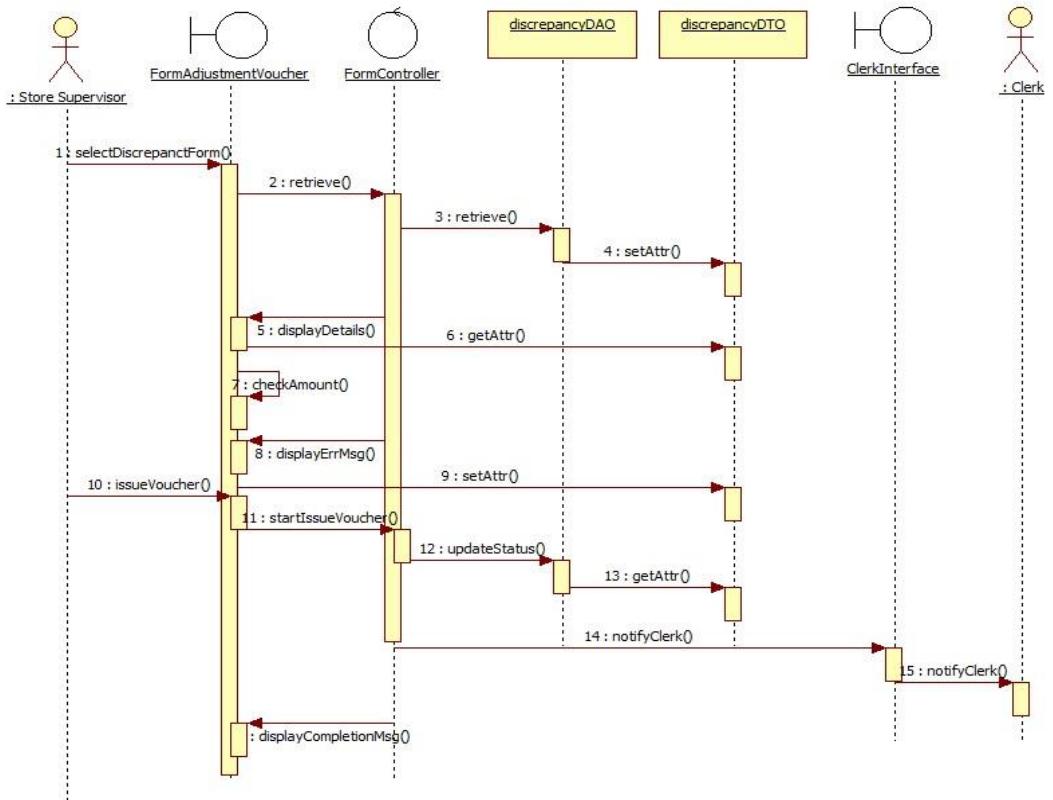
- Store manager view supplier list



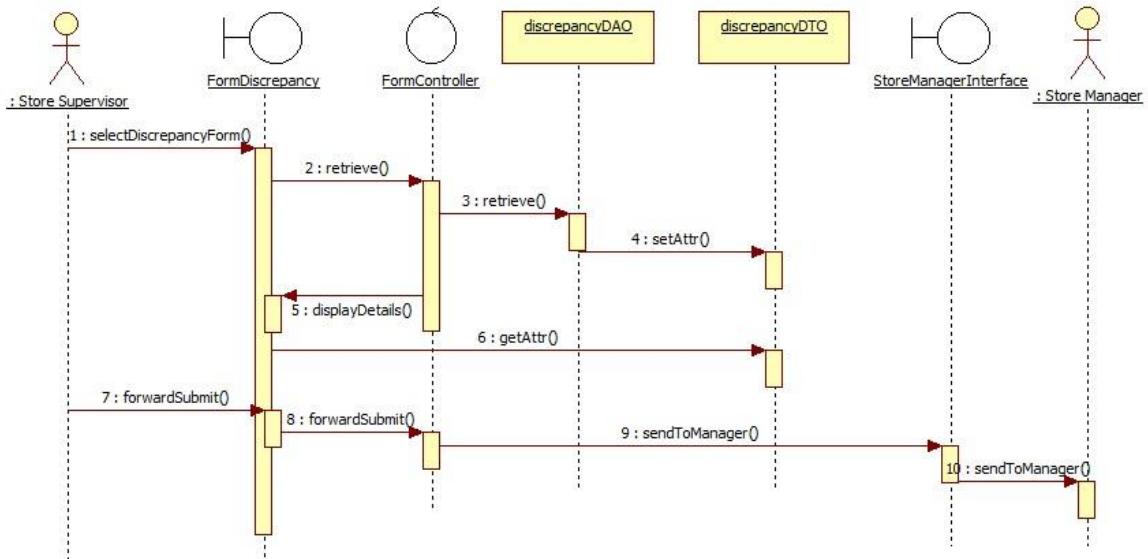
- Store Manager issue adjustment voucher



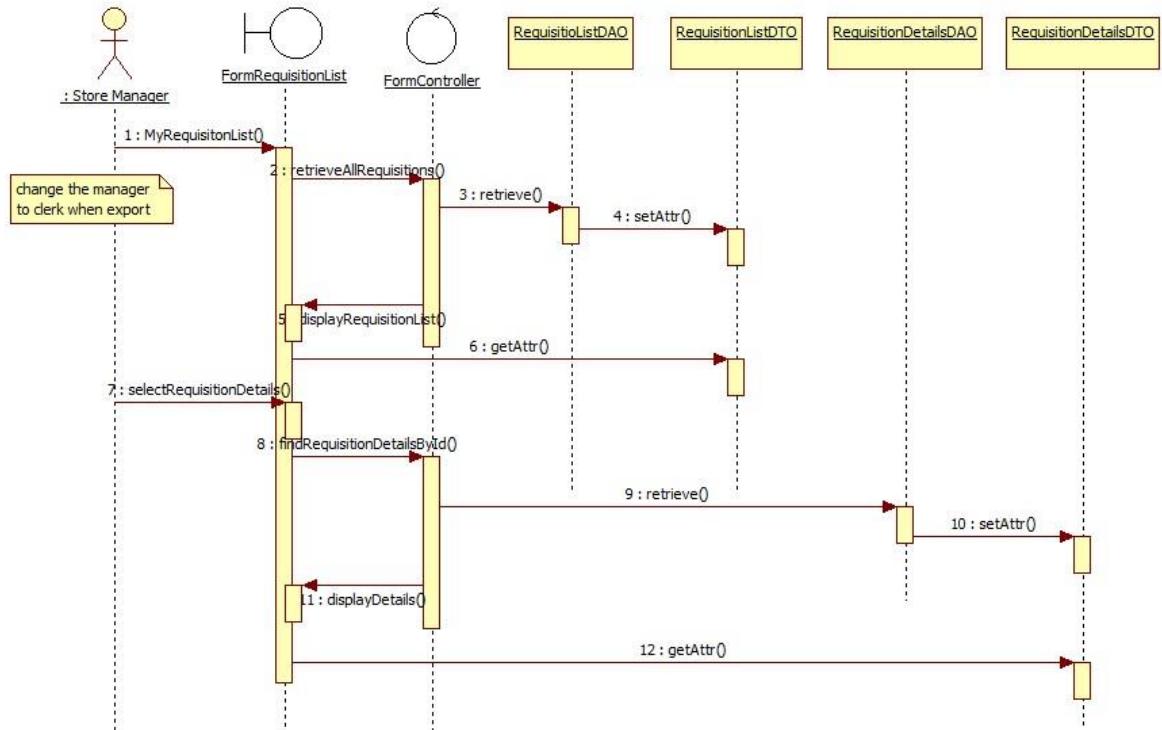
- Supervisor issue voucher



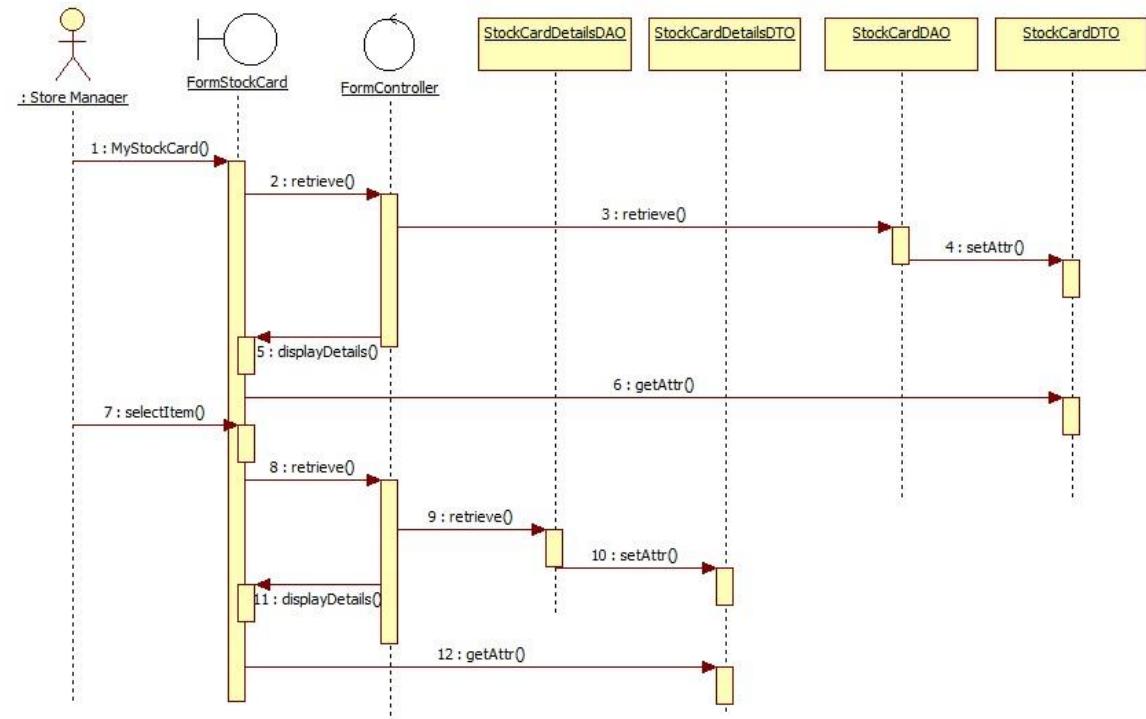
- Supervisor pass discrepancy form to manager



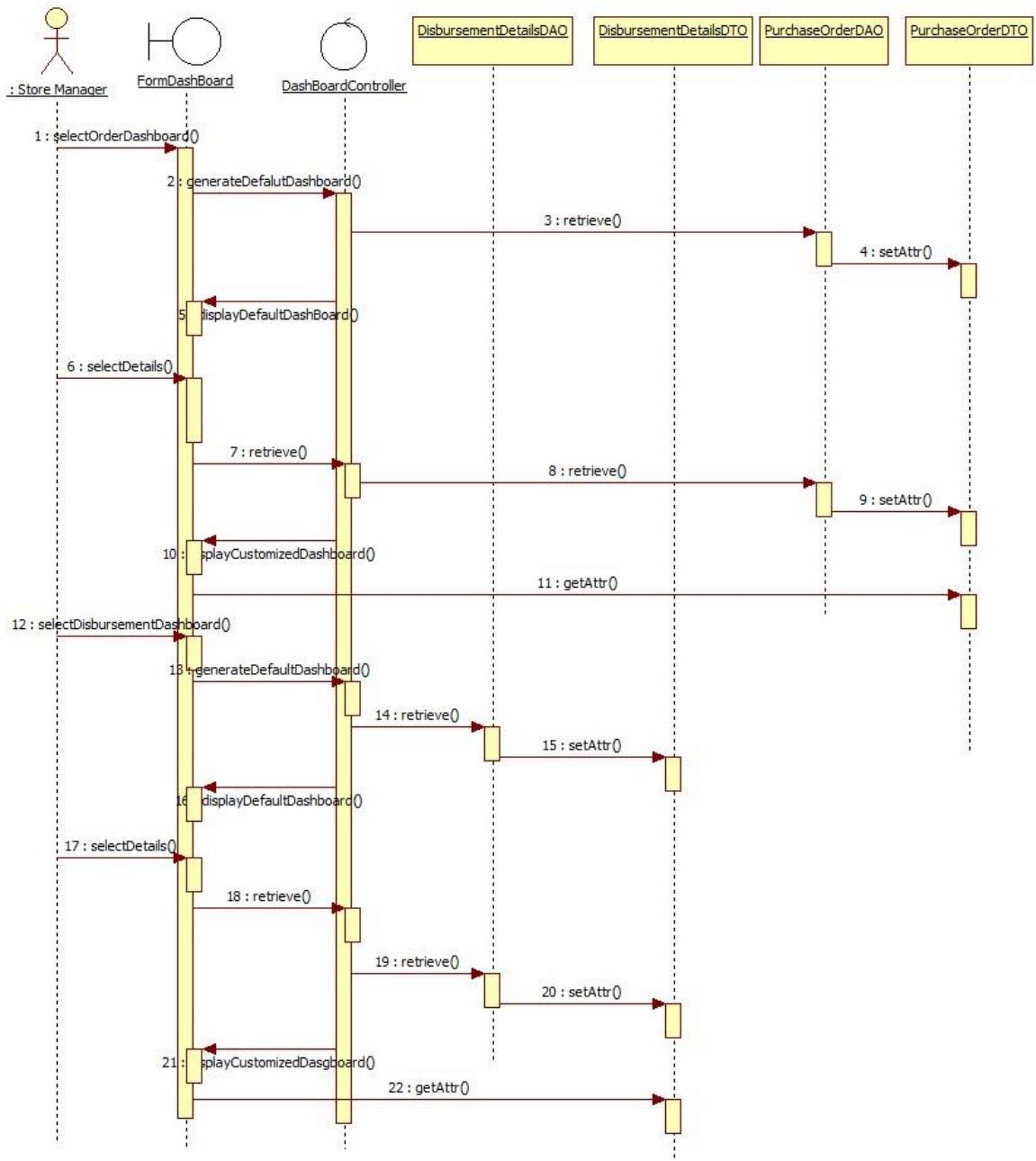
- Store Manager view requisition form



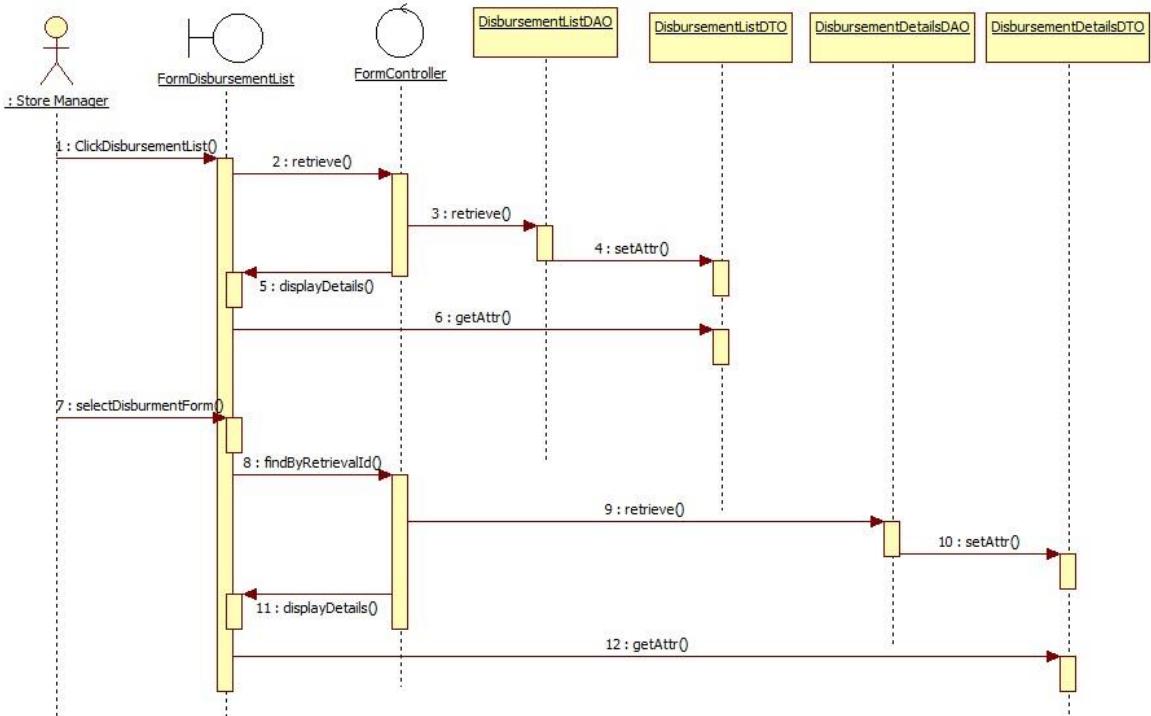
- Store Manager view store card



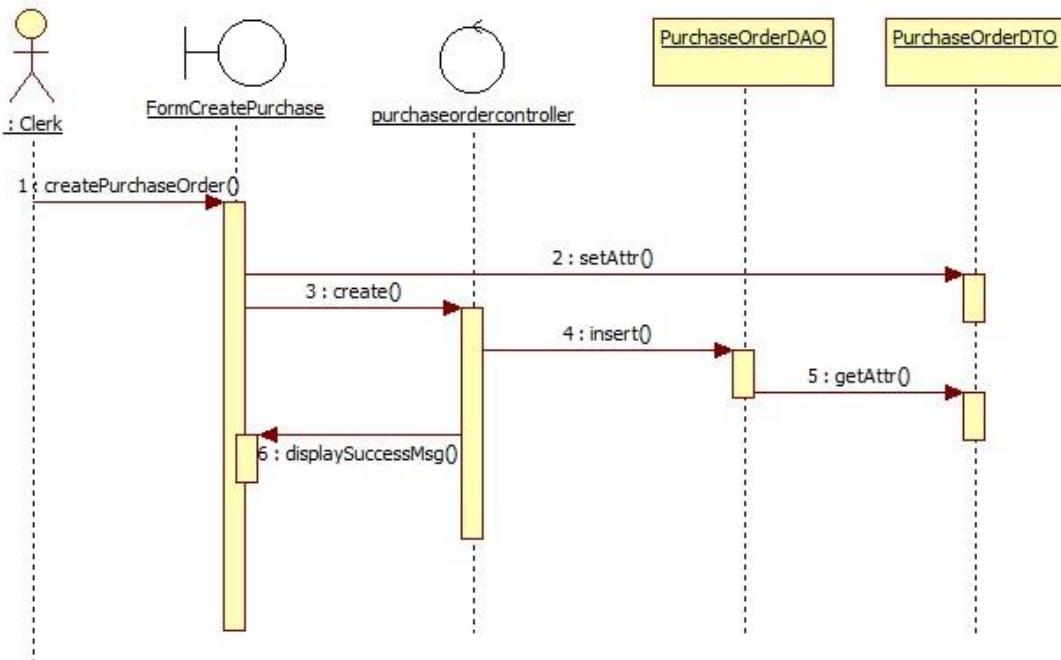
- Store Manager/supervisor/clerk view the dashboard



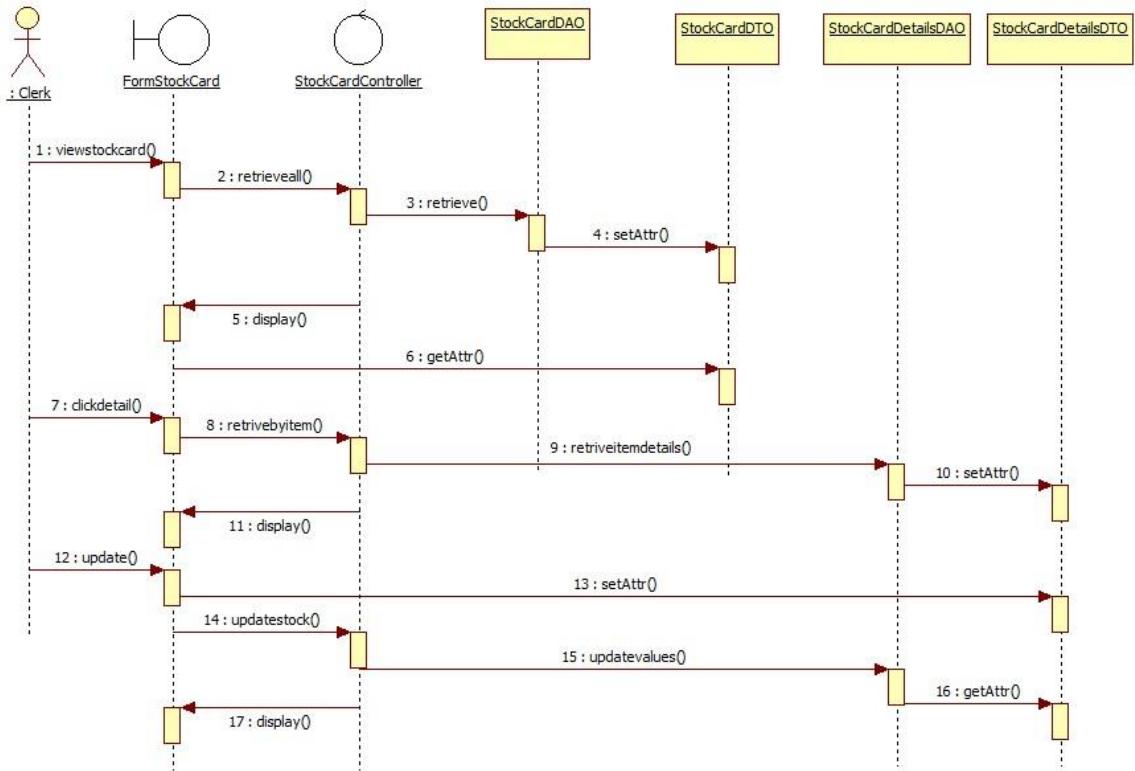
- Store Manager /clerk view disbursement form



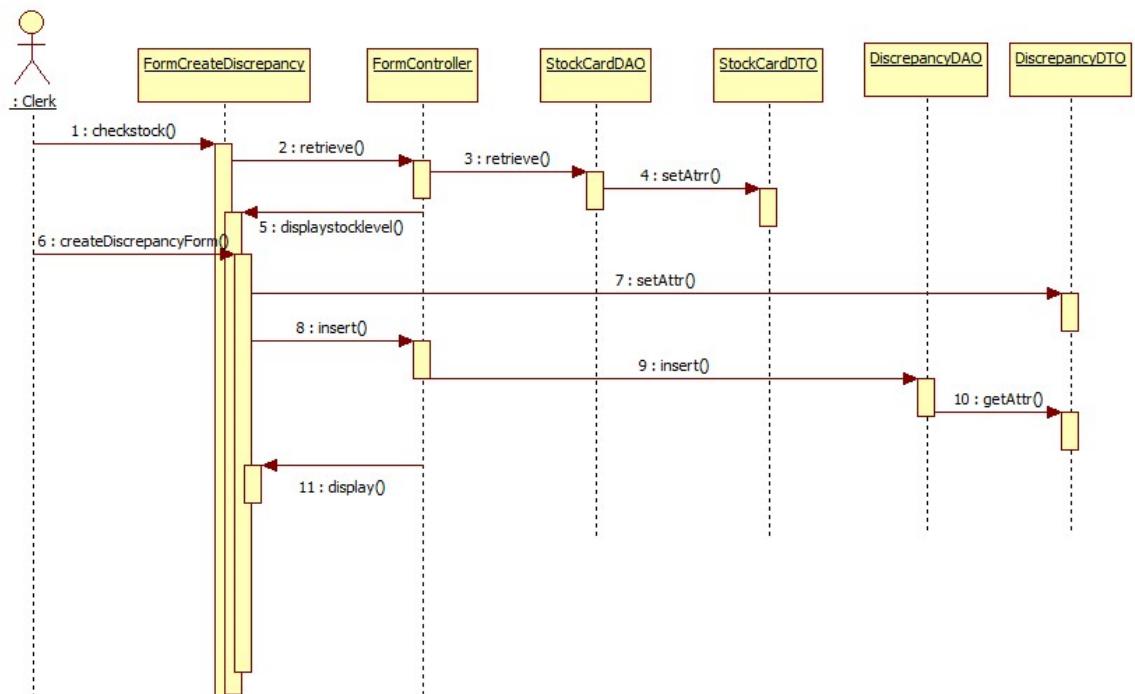
- Clerk create purchase order



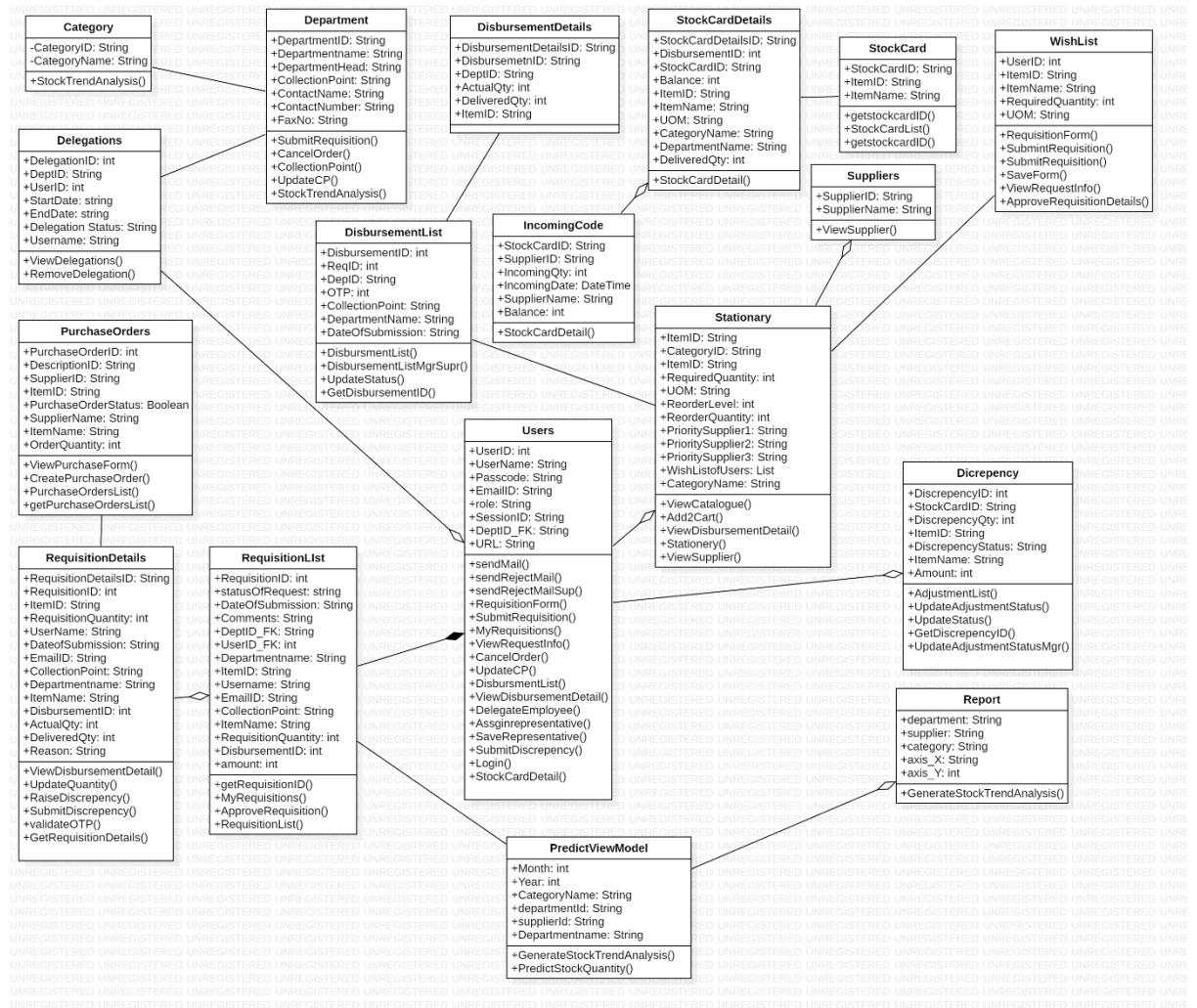
- Clerk update stock card



- Clerk create discrepancy form

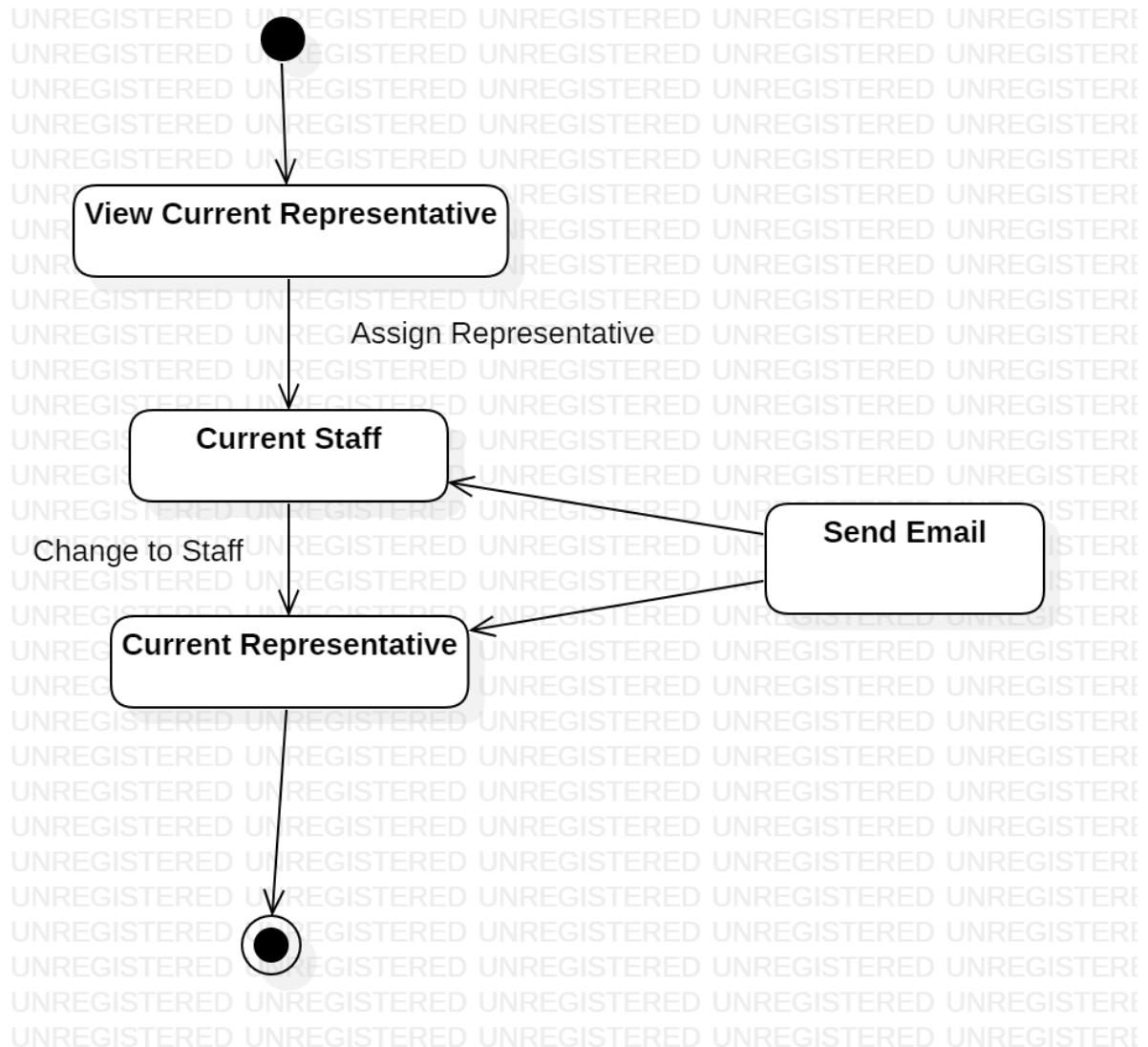


CONSOLIDATED CLASS DIAGRAM

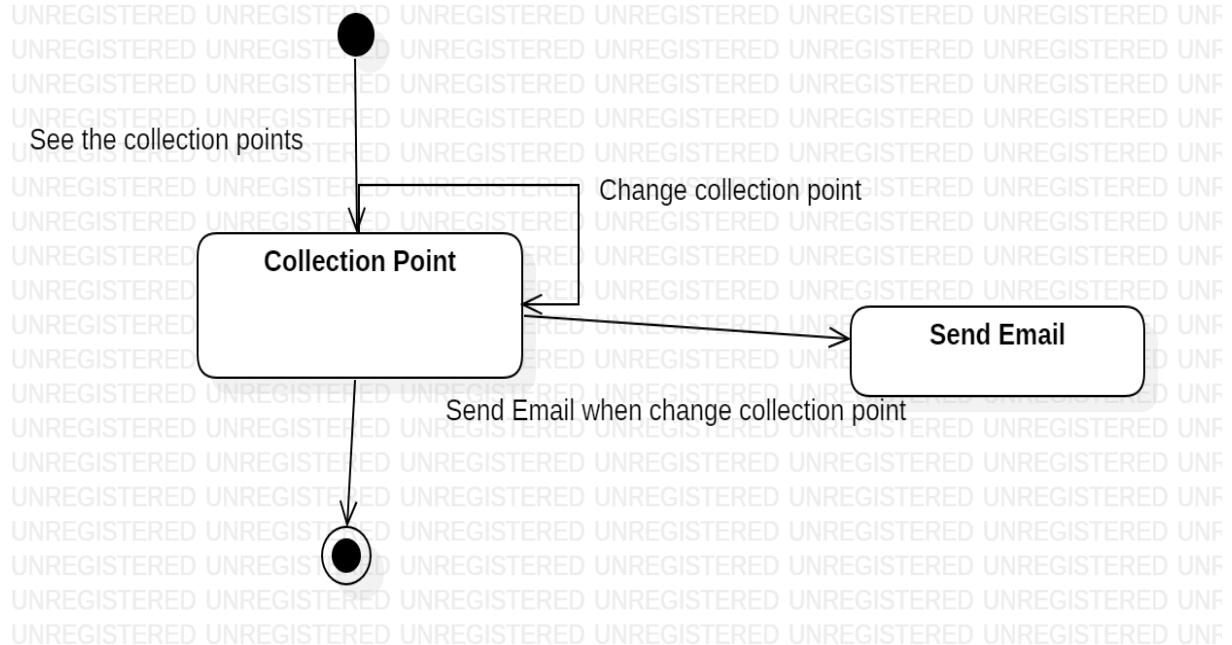


STATECHART DIAGRAM

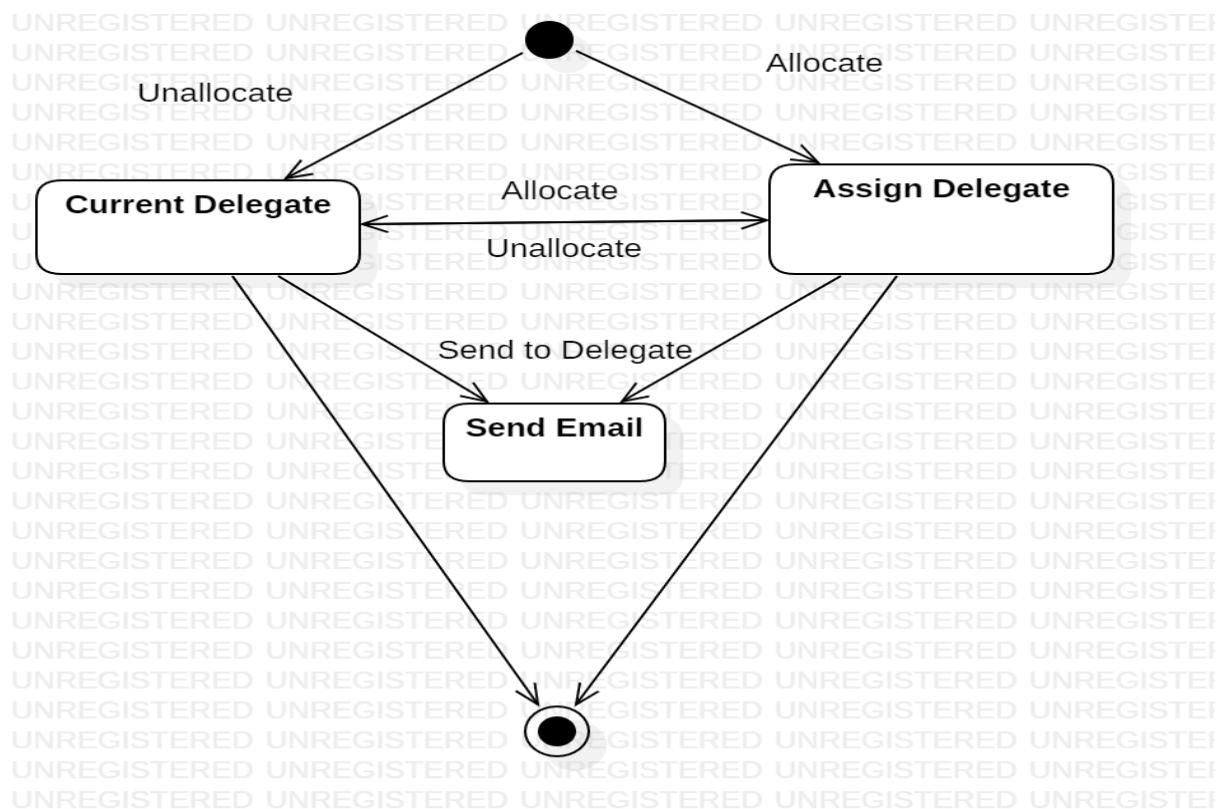
Assign Representative



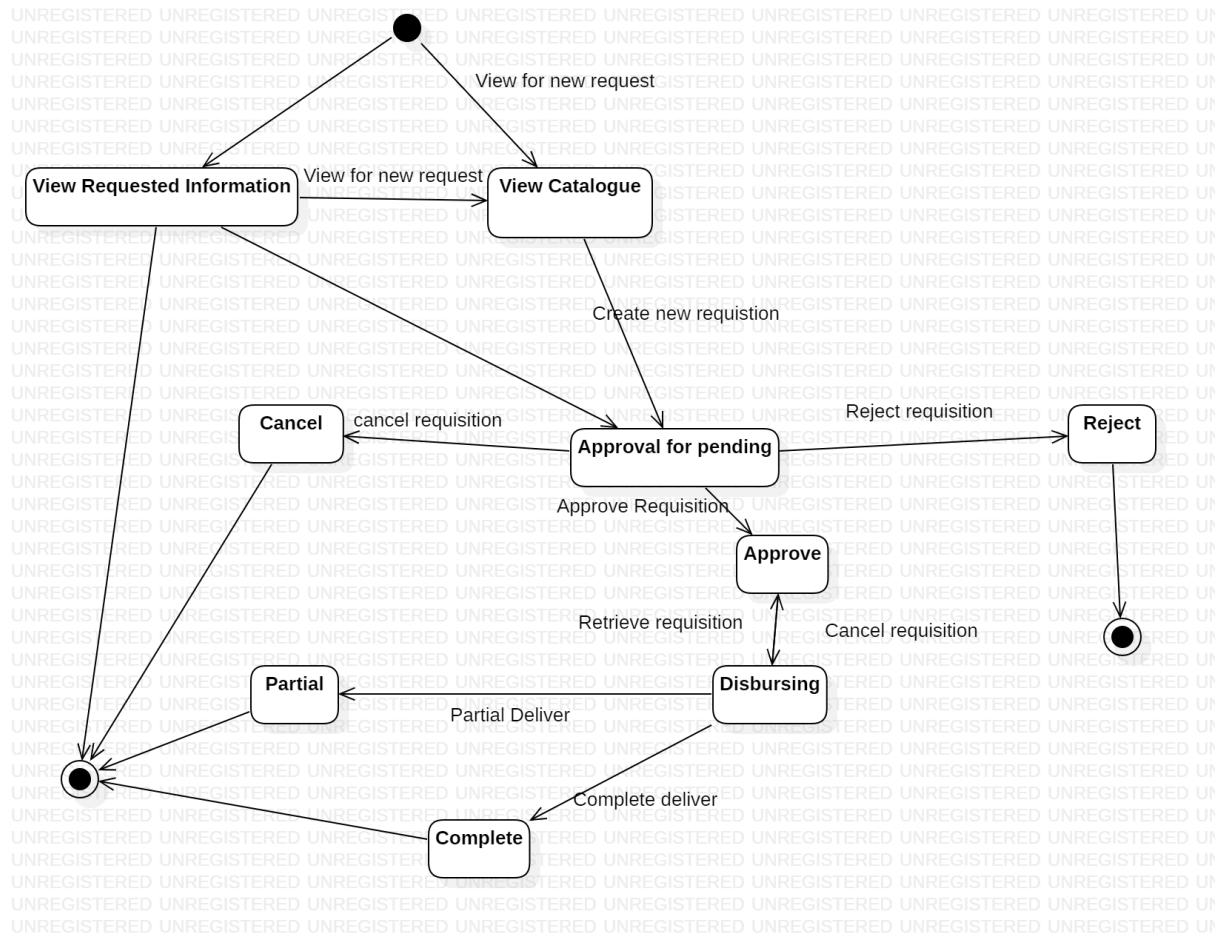
Change Collection Point



Delegation



Requisition



MACHINE LEARNING DOCUMENTATION

Preparing the DATA

```
import pyodbc
import pandas as pd
import pickle
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import GaussianNB
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier

conn = pyodbc.connect('Driver={SQL Server};'
                      'Server=DESKTOP-CCUEBU9;'
                      'Database=ADTeam6;'
                      'Trusted_Connection=yes;')

sql_query=pd.read_sql_query(""" select c.CategoryName,Datepart(month,r1.DateofSubmission) as Month,Datepart(year,r1.DateofSubmission) as Year,sum(rd.RequisitionQuantity) as ReqQty,d.Departmentname
from RequisitionDetail rd,RequisitionList r1,Category c,Stationery s,Department d
where rd.RequisitionID=r1.RequisitionID and rd.ItemID=s.ItemID and s.CategoryID=c.CategoryID and r1.DeptID_FK=d.DepartmentID
group by c.CategoryName,d.Departmentname,Datepart(month,r1.DateofSubmission),Datepart(year,r1.DateofSubmission) ''',conn)

df = pd.DataFrame(sql_query, columns=['CategoryName','Departmentname','Month','Year','ReqQty'])

df.head(10)
df.fillna(df.mean())
dept={
    'English Dept':0,
    'Science Dept':1,
}

cat={
    'Clip':0,
    'Envelope':1,
    'Eraser':2,
    'Gel Pen':3,
    'Ruler':4,
    'Pen':5,
    'Pencil':6,
    'Correction Pen':7,
    'Hole Puncher':8,
    'Scissors':9,
    'Folder':10,
    'Tape':11,
    'Calculator':12,
    'Sticky Note':13,
    'Pencil Sharpener':14,
    'Paper':15,
    'Highlighter':16,
    'Notebook':17,
    'Stapler':18,
    'Book':19
}

df['Departmentname']=df['Departmentname'].map(dept)
df['CategoryName']=df['CategoryName'].map(cat)

df

x=df[['CategoryName','Departmentname','Month','Year']]
y=df['ReqQty']
x_train, x_test, y_train, y_test = train_test_split(x, y, random_state = 3)
x_train
x_test
y_train
y_test
log = LogisticRegression(solver = 'lbfgs')
lr=LinearRegression()
```

First, set up Python environment in Anaconda command prompt. Install Pyodbc , Flask and Waitress. Open Anaconda Navigator and chose the environment you set up in command prompt. Open spyder and admodelpypred.py. Change your mssql server name in sql connection string.

```

knn = KNeighborsClassifier(n_neighbors = 1)
knn.fit(x_train, y_train)
y_pred = knn.predict(x_test)
accuracy_score(y_test, y_pred)
print(knn.predict([[0,0,3,2020]]))
with open('admodelfinal','wb') as f:
    pickle.dump(dept, f)
    pickle.dump(cat, f)
    pickle.dump(knn,f)

```

Making connection with WEB app and machine learning

```

import pandas as pd
from flask import Flask, request, jsonify
import pickle
from waitress import serve

app = Flask(__name__)

with open('admodelfinal', 'rb') as f:
    dept=pickle.load(f)
    cat=pickle.load(f)
    stock_knn=pickle.load(f)
    print(dept , "Category", cat)
    print(stock_knn)

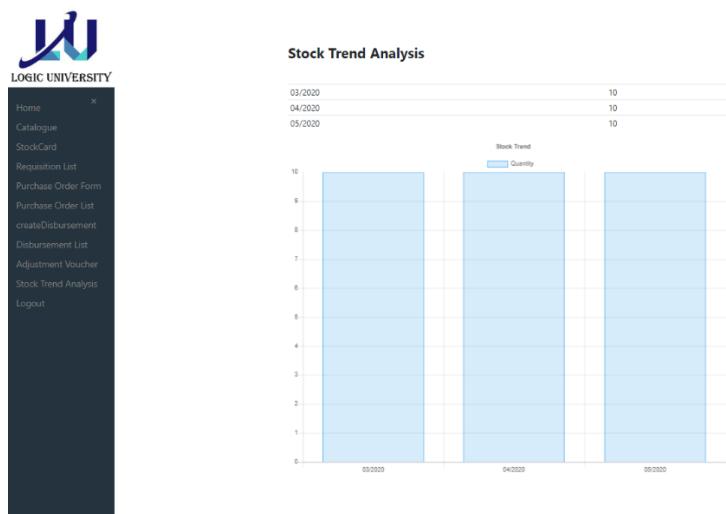
@app.route('/', methods=['POST','GET'])
def api():

    req = request.get_json(force = True)
    CategoryName = cat.get(req['CategoryName'])
    print(req['CategoryName'])
    print(CategoryName)
    Departmentname = dept.get(req['Departmentname'])
    print(req['Departmentname'])
    print(Departmentname)
    print(req['Month'])
    print(req['Year'])
    prediction = stock_knn.predict([[CategoryName,Departmentname, req['Month'],req['Year']]])
    print(prediction)
    result = prediction.tolist()[0]
    print(result)
    return jsonify(result)

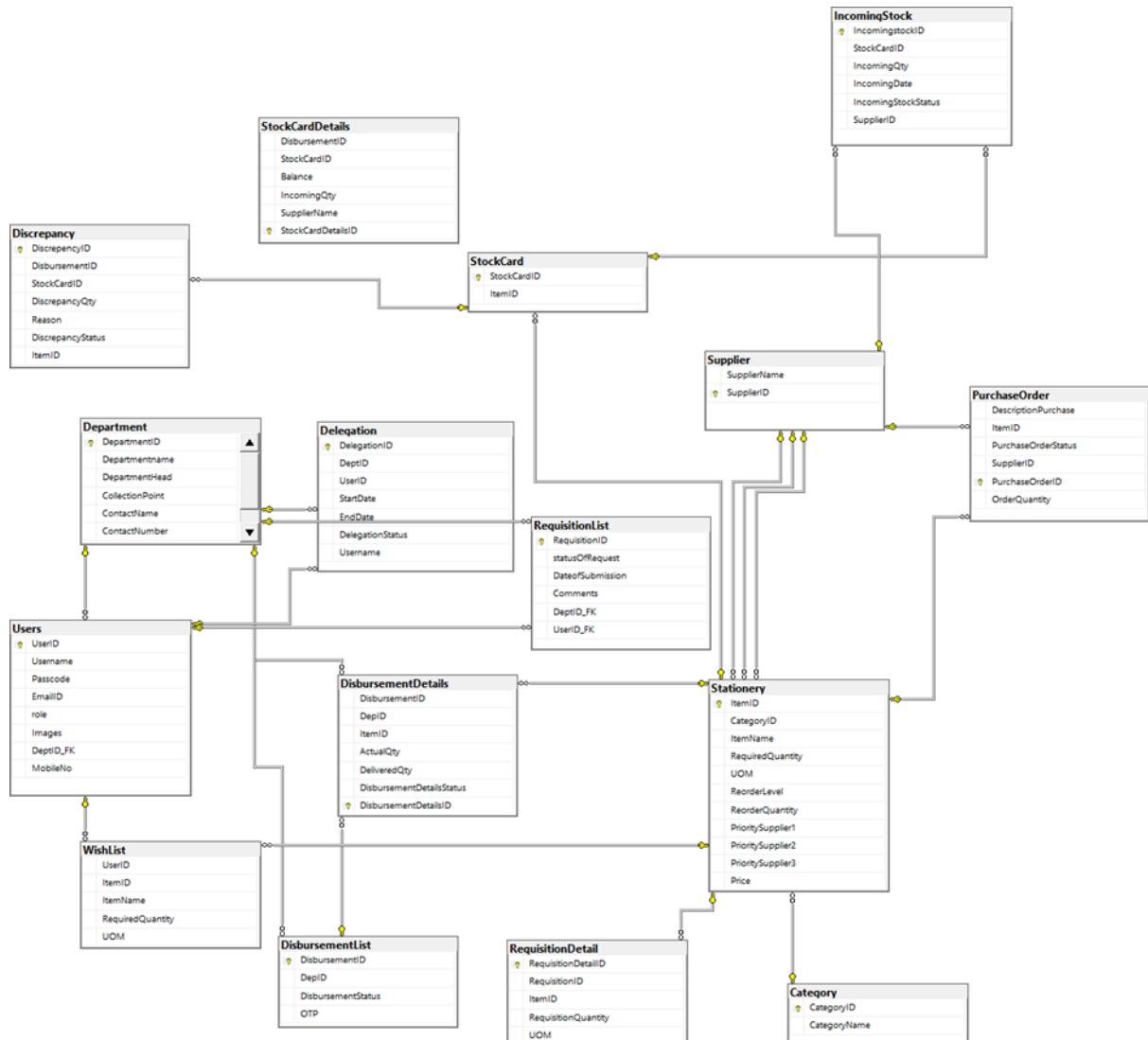
# run the server
if __name__ == '__main__':
    serve(app, host="0.0.0.0", port=5000)
    app.run('127.0.0.1', 5000,debug=True)

```

The output



RELATIONAL DB DESIGN



2.3. IMPLEMENTATION WORKFLOW (CODE)

The softcopy of the codes are uploaded to LUMINUS.

2.4. TEST WORKFLOW (TEST PLAN)

Test plan 1

Test plan 2

Test plan 3

Test Plan 1										
Test Type: Unit/Integration/System/Acceptance										
TestID: 01	Prepare by/date: Yan Hmue Aung/ 04-02-2020			Tested by/date: Yan Hmue Aung / 04-02-2020						
Test Description Test "Login" for all Employees of the application				Program tested Boundary Class: Log_in Control Class: StaffController Entity Class: staff, department						
Test Data (1)Staff										
UserID	Username	Passcode	EmailID	role	SessionID	Images	DeptID_FK			
1243	srirama	739969b5...	mandasrirara...	D e pHead	NULL	https://me...	CPSC			
1244	shiva	739969b5...	shiva.7@g...	SSupervisor	NULL	NULL	CPSC			
1245	Sandeep	739969b5...	deepu.sun2...	DepStaff	NULL	https://me...	CPSC			
1246	yeemon	739969b5...	yeemonau...	DepRep	NULL	https://me...	CPSC			
1247	yanhmue	739969b5...	yanhmuea...	DepStaff	NULL	https://me...	CPSC			
1248	KhineSu	739969b5...	khaingsum...	SClerk	NULL	https://me...	CPSC			
(2)department										
•										
DepartmentID		Departme...	Departme...	Collection...	ContactNa...	ContactNu...	FaxNo			
ENGLISH		English	Dr.Yee Mon...	School of C...	Ms Yee Mo...	4567893	3872098			
CPSC		Computer ...	Dr. Soh Kia...	NUS Busin...	Mr Wee Kia...	8901235	8921457			
D003		Commerce ...	Dr.Chia Leo...	Departmen...	Mr Mohd.A...	8741284	8921256			
D004		Registrar D...	Mrs Low K...	Departmen...	Ms Helen Ho	8901266	8921465			
D005		Zoology De...	Prof Tan	Departmen...	Mr Peter Ta...	8901266	8921465			
s/n	Test Step			Expected Result		Actual Result				
1	Click "Login" button with empty fields of "Username" and "Password"			Field is required and remind through "Username and Password are required."		As per expected result.				
3	Enter a wrong Username and password, then click "Login" button.			Unable to login and error fields are showed.		As per expected result.				
4	Enter a proper Username and leave "Password" field empty, then click "Login" button.			Field is required and remind through "Password is required." will appear at "Password" field box.		As per expected result.				
5	Enter a proper Username and a wrong password, then click "Login" button.			Unable to login and error fields are showed.		As per expected result.				
6	Enter a proper Username and a correct password, then click "Login" button.			Successfully login and corresponding page is showed for different types of employee.		As per expected result.				

Test Plan 2																	
Test Type: Integration																	
TestID: 02		Prepare by/date: Yan Hmue Aung /06-02-2020		Tested by/Date : Yan Hmue Aung / 06-02-2020													
Test Description Testing “Raise new requisition form” as a department staff.		Program tested Boundary Class: Log_in, View Requisition Form Control Class: StaffController Entity Class: staff															
Test Data																	
(1) Staff																	
UserID	Username	Passcode	EmailID	role	SessionID	Images	DeptID_FK										
1243	srirama	739969b5...	mandasirira...	DepHead	NULL	https://me...	CPSC										
1244	shiva	739969b5...	shiva.7@g...	SSupervisor	NULL	NULL	CPSC										
1245	Sandeep	739969b5...	deepu.sun2...	DepStaff	NULL	https://me...	CPSC										
1246	yeemon	739969b5...	yeemonau...	DepRep	NULL	https://me...	CPSC										
1247	yanhmue	739969b5...	yanhmuea...	DepStaff	NULL	https://me...	CPSC										
1248	KhineSu	739969b5...	khaingsum...	SClerk	NULL	https://me...	CPSC										
(2)Department																	
•																	
DepartmentID		Departme...	Departme...	Collection...	ContactNa...	ContactNu...	FaxNo										
ENGLISH		English	Dr.Yee Mon...	School of C...	Ms Yee Mo...	4567893	38720										
CPSC		Computer ...	Dr. Soh Kia...	NUS Busin...	Mr Wee Kia...	8901235	89214										
D003		Commerce ...	Dr.Chia Leo...	Departmen...	Mr Mohd.A...	8741284	89212										
D004		Registrar D...	Mrs Low K...	Departmen...	Ms Helen Ho	8901266	89214										
D005		Zoology De...	Prof Tan	Departmen...	Mr Peter Ta...	8901266	89214										
(3)Stationery																	
ItemID	CategoryID	ItemName	RequiredQ...	UOM	ReorderLe...	ReorderQ...	PrioritySu...	PrioritySu...	PrioritySu...	Price							
C001	1	Clips Double 1"	NULL	Dozen	50	30	S001	S003	S004	NULL							
C002	1	Clips Double 2"	NULL	Dozen	50	30	S001	S003	S004	NULL							
C003	1	Clips Double 3/4"	NULL	Dozen	50	30	S001	S003	S004	NULL							
E001	2	Envelop Brown(3"x6")	NULL	Each	600	400	S001	S003	S004	NULL							
E002	2	Envelop White(3"x6")	NULL	Each	600	400	S001	S003	S004	NULL							
E003	2	Envelop Brown(5"x7")	NULL	Each	600	400	S001	S003	S004	NULL							
E020	3	Eraser(hard)	NULL	Each	50	20	S002	S003	S004	NULL							
(4)Requisition																	
Requisitio...	statusOfR...	DateofSub...	Comments	DeptID_FK	UserID_FK												
454545	Pendingfor...	04/02/2020	NULL	CPSC	1245												
454546	Pendingfor...	04/02/2020	NULL	CPSC	1245												
s/n Test Step Expected Result Actual Result																	
1	Login as a department staff by entering “Username” and			Successfully login as a department staff.		As per expected result.											

	“Password”, then click on “Login” button.		
2	Raise a new request by adding quantity for each item in Stationery Catalogue.	New request order created according to item code and quantity entered. “Quantity” must be a number.	As per expected result.
3	In requisition form, can see raised request in stationery catalogue. By clicking “Remove” button ,can remove requested item if it is not necessary. Raise a new request by select item code and enter quantity, then submit request by clicking “Submit” button.	New Request order created according to Item Name,Unit of Measure and Required Quantity.	As per expected result.
4	In My Requisition, staff can see the request which was made recently. By clicking view button, staff can see the details of request.	Staff can see the raised request according to requestID, Date of Submission and Status of Request.	As per expected result.
6	Logout by clicking logout button on left side bar of the page.	Account logged out, and back to login page.	As per expected result.

Test Plan 3			
Test Type: Integration			
TestID: 03	Prepare by/date: Yan Hmoe Aung /13/02/2020	Tested by/Date : Yan Hmoe Aung / 13/02/2020	
Test Description Testing “Approve the requisition form” as a department head.	Program tested Boundary Class: View Pending Department_Staff Requests Control Class: DepartmentHeadController Entity Class: department Head		
Test Data (1) Staff			

UserID	Username	Passcode	EmailID	role	SessionID	Images	DeptID_FK
1243	srirama	739969b5...	mandasirira...	DepHead	NULL	https://me...	CPSC
1244	shiva	739969b5...	shiva.7@g...	SSupervisor	NULL	NULL	CPSC
1245	Sandeep	739969b5...	deepu.sun2...	DepStaff	NULL	https://me...	CPSC
1246	yeemon	739969b5...	yeemonau...	DepRep	NULL	https://me...	CPSC
1247	yanhmue	739969b5...	yanhmuea...	DepStaff	NULL	https://me...	CPSC
1248	KhineSu	739969b5...	khaingsum...	SClerk	NULL	https://me...	CPSC

(2)Department

*

DepartmentID	Departme...	Departme...	Collection...	ContactNa...	ContactNu...	FaxNo
ENGLISH	English	Dr.Yee Mon...	School of C...	Ms Yee Mo...	4567893	38720
CPSC	Computer ...	Dr. Soh Kia...	NUS Busin...	Mr Wee Kia...	8901235	89214
D003	Commerce ...	Dr.Chia Leo...	Departmen...	Mr Mohd.A...	8741284	89212
D004	Registrar D...	Mrs Low K...	Departmen...	Ms Helen Ho	8901266	89214
D005	Zoology De...	Prof Tan	Departmen...	Mr Peter Ta...	8901266	89214

(3)Stationery

ItemID	CategoryID	ItemName	RequiredQ...	UOM	ReorderLe...	ReorderQ...	PrioritySu...	PrioritySu...	PrioritySu...	Price
C001	1	Clips Double 1"	NULL	Dozen	50	30	S001	S003	S004	NULL
C002	1	Clips Double 2"	NULL	Dozen	50	30	S001	S003	S004	NULL
C003	1	Clips Double 3/4"	NULL	Dozen	50	30	S001	S003	S004	NULL
E001	2	Envelop Brown(3"x6")	NULL	Each	600	400	S001	S003	S004	NULL
E002	2	Envelop White(3"x6")	NULL	Each	600	400	S001	S003	S004	NULL
E003	2	Envelop Brown(5"x7")	NULL	Each	600	400	S001	S003	S004	NULL
E020	3	Eraser(hard)	NULL	Each	50	20	S002	S003	S004	NULL

(4)Requisition

Requisitio...	statusOfR...	DateofSub...	Comments	DeptID_FK	UserID_FK
454545	Pendingfor...	04/02/2020	NULL	CPSC	1245
454546	Pendingfor...	04/02/2020	NULL	CPSC	1245

s/n	Test Step	Expected Result	Actual Result
1	Login as a department head by entering “Username” and “Password”, then click on “Login” button.	Successfully login as a department head.	As per expected result.
2	Click on “Approve Requisition” to view pending requests list, contains “RequestID”, “Employee Name”, “Date of Submission” and “status of	Successfully approve the pending request by clicking “Approve” button and send email notification to department staff who has raised request. Otherwise, reject the pending request via clicking “Reject”	As per expected result.

	<p>Request". Staff see details of request with Item Name, Unit of Measure and Order Quantity via clicking "View" Button. As a Department Head, approve or reject the pending requests by clicking "Approve" or "Reject" button. If department head make reject the pending request, some comment can be added if necessary.</p>	button and also notify by email to department staff.	
3	Logout by clicking logout button on right upper area of the page.	Account logged out, and back to login page.	As per expected result.

3. RECOMMENDATIONS

- Detection of fraudulent transaction / orders using Machine Learning for Store to avoid discrepancy.
- Recommendations of favourite items for Department Staff.
- Chatbot for Department employees to contact the Stationery Store Staffs.
- Implement charge back features.
- Implement push notifications features for users.

4. LESSONS LEARNT

- Carrying data from Android to Server
- Initially, user requirements should be gathered properly
- UI Design should be reviewed by the user and modified after feedback so that deliverable standards would meet the user requirements
- Database has to be consistent so that integration will be easy
- For trying Machine Learning model, we need more data
- All the team members should use the same naming convention to avoid namespace collision

5. PROBLEMS AND SOLUTIONS

1. Problem- Establishing connection between IIS server and Python
Solution- Build Api in Python using Flask,installing waitress,fixing servername
2. Problem-Nan values in dataset after categorizing data.
Solution- Clean the data and fill the missing values.
3. Problem-Create Disbursement is hard to handle to be system auto generate.
Solution- A button for user action to create disbursement list.
4. Problem- Updating the database attributes and data types frequently during code implementation time.
Solution- Each member have to write their changes made in the google drive.Uploading the latest backup database before combining codes.

6. LOOKING BACK

In retrospect as a team we have delivered the project to our best and feel contented with what we have delivered. The journey was definitely tough as we had faced challenges along the way. However, our team members were supportive of each other and helped one another allowing the team to successfully submit the project. We have learnt through the process and it was an enriching experience for us all. There are a few things that we would want to attempt differently in future

- 1) Use Entity Framework for .NET application rather than ADO.NET
Entity Framework is more commonly used in the industries and a good understanding of it will be useful
- 2) Using Git Hub for .NET application
Git Hub is more commonly used in the industries and having a good knowledge of GIT will help to integrate faster
- 3) Review code early upon completion of key tasks
Bugs in key tasks affected the progress of other tasks and created a snowball effect causing a delay in progress which could have been avoided if we had reviewed the code earlier
- 4) Changes made to the database or codes needs to be documented and communicated to other team members regularly

Team members were unaware of the changes made by each other and causing the database used by team members to be different and thus causing unnecessary confusion

There are always room for improvements, and we feel that although there are things that could have been done differently, this experience is something we will always cherish and value. Our android and web applications are something we are very proud of and we hope to achieve and explore more in our future projects.