



Sri Lanka Institute of Information Technology

Design Document for Procurement System

Case Studies for Software Engineering Assignment 01

Submitted by: CSSE_WE_6

Submitted to:

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Table of Contents

Member Details	1
Introduction	3
Use Case Diagram	4
Assumptions and Terms used in Use Cases	5
Assumptions	5
Terms	5
Use Case Scenarios	6
Class Diagram	16
Sequence Diagram	17
Low fidelity User Interaction Diagrams	19
Create Purchase Requisition Page	19
View Purchase Requisitions Page	20
Approve Purchase Requisition Page	21
Receive Orders Page	22
View Purchase Requisitions UI for Mobile application	23
Receive Orders UI for Mobile Application	24
High fidelity User Interaction Diagrams	25
Login page for mobile application	25
Login page for web application	26

Introduction

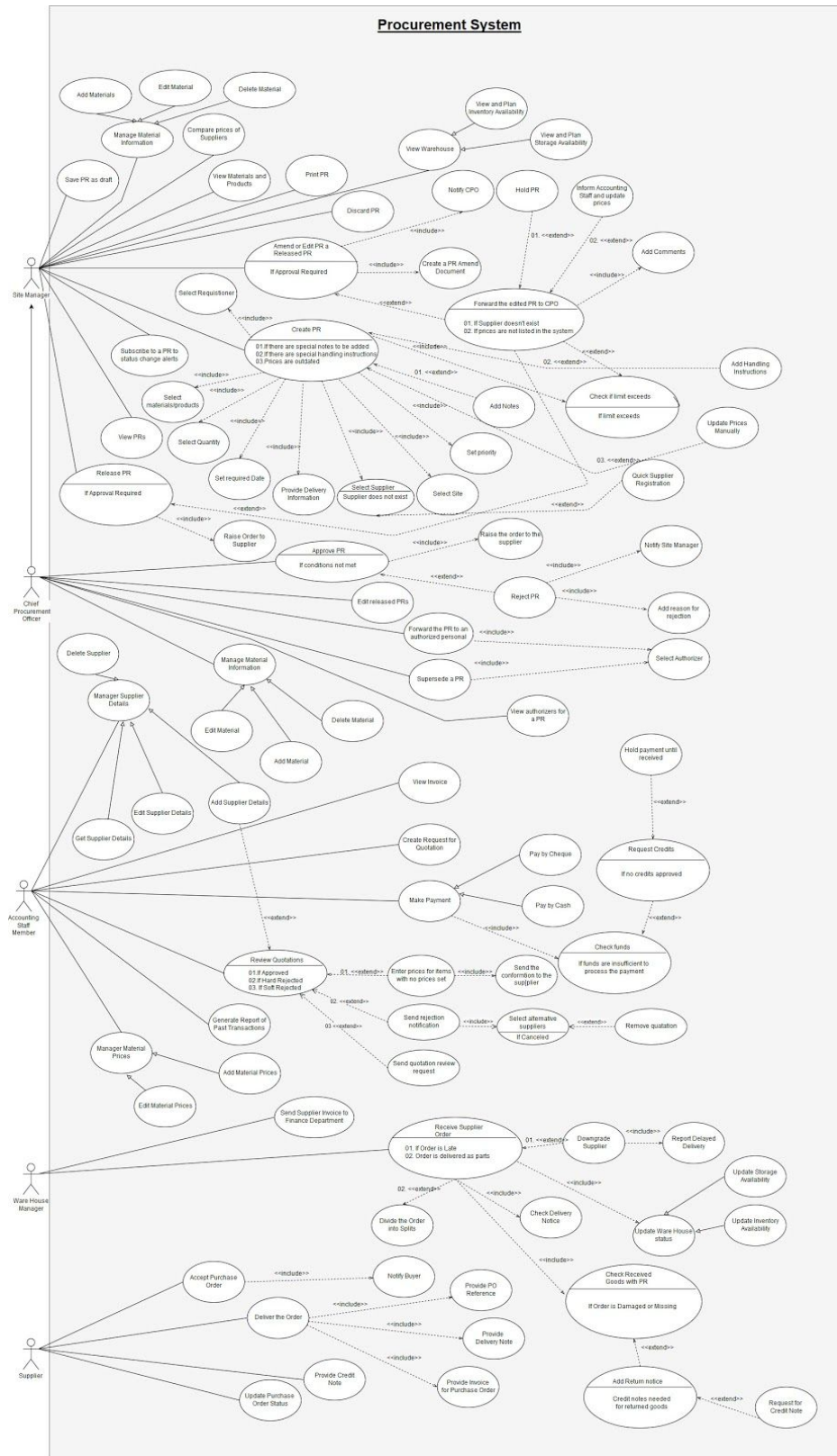
Material procurement process is at the heart of construction industry due to many reasons. Even though it looks like a simple and straightforward process, when mismanaged, material procurement can seriously affect the profit margin, product quality, labour utilization and result in a failure of the project. The factors such as limited storage due to the highly dynamic nature of the construction sites, highly distributed construction sites, contract based labour, tightly scheduled construction goals make the necessity for a well defined construction process at utmost importance in construction industry.

The design presented in this document is for a distributed procurement system to minimize the procurement errors by providing means of well defined interfaces with proper functionality to the relevant stakeholders. The simple flow of the system would be, when a site manager makes an order, a chief procurement officer would approve the order by which time the finance staff will make the payments and finally once the supplier delivers the goods a warehouse manager at the site would verify and accept the materials.

This system is designed to eliminate the communication issues which are common in the construction industry. The software will give convenient interfaces suitable for the job role, such as a mobile app for site and warehouse manager while a web application for finance staff. Since all users are properly authenticated and authorized, only the relevant functionality is available for a respective user, so that responsibilities and job roles are not overlapped which enables the construction process to be advanced smoothly with minimum level of conflict and communication mismatches.

This is a technical design document which consists of a use case diagram with most important scenarios, a detailed class diagram, sequence diagrams and finally low fidelity and high fidelity user interface designs as user interaction diagrams.

1. Use Case Diagram



Google drive link to the above document:

<https://drive.google.com/open?id=1ZDUl5bPGuWTaPfZb1vp0d2HNiu5po2eW>

1.1.Assumptions and Terms used in Use Cases

1.1.1. Assumptions

1.1.2. Terms

- PR – Purchase Requisition
- PO – Purchase Order
- CPO – Chief Procurement Officer
- Delivery Notice - goods that describes the goods and the quantities being delivered
- Credit Note - a receipt given by a supplier to a buyer who has returned goods, which can be offset against future purchases
- Purch Req - An order raised internally but needs approval before sending to supplier
- Purch Order - The order which is sent to the supplier
- Supplier Invoice - The total bill issued by the supplier after goods are delivered
- Supersede Authorization of a Purch Req - take the place of the authorized person to authorize a PR.
- Forward Authorization of a Purch Req - forward the authorization of a PR to someone.
- Request for Quotation (RFQ)- an RfQ is interesting when you have never purchased the products with that supplier before and therefore don't know their price.
- RfQs become unnecessary once you have established your favorite supplier for each item and will only increase the delay in the delivery of your items. In that case, the process will be simpler by starting straight from a Purchase Order
- Amending a PR -
 - You cannot change the order reference.
 - You can only change the supplier if no goods or services have been added to the order.
 - You can add, amend and delete items on an order depending on how complete the order is.
 - You cannot change any details once an order is approved

- When you amend a PO, the system creates a PO Amend (POA) document based on the existing PO Reference. Enter a reason when initiating the amendment. When the amendment is submitted, the CPO receives a notification. This is his or her notification that the order has changed
- Authorized Site Managers with special privileges can register a supplier quickly, when creating a Purchase Requisition.
- Site Manager can add only material information to the system, this does not state that the prices can added as well. Prices for materials are determined by the Accounting Staff. This approach is used because the Account Staff do not have the technical knowledge about materials that are used in the site. Therefore, material information is added by the Site Manager and their prices are managed by the Accounting Staff.

2. Use Case Scenarios

Use Case No	1
Use Case Title	Creating a Purchase Requisition
Primary Actor	Site Manager
Pre-conditions	User should be authorized to raise a PR
Main Success Scenario	<ol style="list-style-type: none">1. User logs into Procurement System2. User navigates to Purchase Requisition Page3. User clicks on the Add Button4. User enters the Site5. User enters the Requisitioner6. User enters the Required Part7. System shows available Suppliers for the required part8. User selects a Supplier9. User enters the required Quantity10. System fetches the unit price of the part of the Supplier11. System calculates the total gross amount for the order.12. User enters the Required Date13. User enters the Delivery Address14. User saves the new Purchase Requisition15. System changes the status of PR from “Created” to “Planned”16. User releases the order17. System raises the Order to Supplier
Extensions	<p>6a. Required Part is not available in the System</p> <p>6a.1. System shows an Info message and displays a part is not available in the system.</p> <p>6a.2. System shows Create Inventory Part button</p> <p>6a.3. User clicks the Create Inventory Part button</p> <p>6a.4. System navigates the user to Create Inventory Part Page</p>

	<p>6a.5. User enters new Part's details to the system</p> <p>6b. Required Part needs an authorization</p> <p>6b.1. System shows an info message and display an approval is needed for the entered part</p> <p>6c. Required Part needs special Handling Instructions</p> <p>6c.1. System shows the part needs Special Handling Instruction as an info message</p> <p>6c.2. System adds handling information</p> <p>7a. Supplier is not available for the entered part</p> <p>7a.1. System shows an Info message and displays a supplier is not available for the part.</p> <p>7a.2. System shows a Quick Supplier Registration Button</p> <p>7a.3. User clicks the Button</p> <p>7a.4. System checks user's authority</p> <p>7a.5. System navigates to add Supplier Page</p> <p>7a.6. User enters new Supplier's Details</p> <p>10a. Fetched Unit Price by the system is outdated</p> <p>10a.1. User selects Update Price Manually Option</p> <p>10a.2. System checks user's authority</p> <p>10a.3. User enters new Unit Price</p> <p>10a.4. System recalculates new total gross amount</p> <p>14a. The total gross amount exceeds the limit of Rs.100,000.</p> <p>14a.1. System changes the status of PR from "Planned" to "To be Authorized"</p> <p>14a.2. System sends a notification to the Procurement Staff about the raised PR.</p>
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	<p>14b. User wants to check the available quantity for the entered part in the stock in the site</p> <p>14b.1. User selects Inventory Part Availability Button</p> <p>14b.2. System shows the available quantity for the part</p> <p>14c. User wants to check the available storage space for the entered Site</p> <p>14c.1. User selects the Storage Availability Button</p> <p>14c.2. System shows the information about the storage of the warehouse and its availability</p> <p>14d. User wants to add a special notice about the PR</p> <p>14d.1. User select add Note button</p> <p>14d.2. User enters the Note</p> <p>14e. User wants to print the created PR</p> <p>14e.1. User clicks Print PR button.</p> <p>14e.2. System generates a PDF and prompts an email address</p> <p>14e.3. User enters the email address</p> <p>14e.4. System sends an email to the email address.</p>
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Use Case No	2
Use Case Title	Approving a Purchase Requisition
Primary Actor	Chief Procurement Officer
Pre-conditions	User should be authorized to approve a PR; PR should be in “To be Approved” state
Main Success Scenario	<ol style="list-style-type: none"> 1. User logs into Proc System 2. User navigates to Purchase Requisition Page 3. User clicks filters the records by Unauthorized PRs 4. System shows unauthorized PR lines 5. User selects the required PR line 6. User selects Approve Button 7. System changes the status of PR from “To be Authorized” to “Approved” 8. System generates a Purchase Order Reference 9. System raises the Purchase Order to the Supplier along with the Purchase Order Reference
Extensions	<p>5a. User wants to give the authority to approve the PR to another Procurement Staff Member.</p> <ol style="list-style-type: none"> 5a.1. User clicks the Forward Authorization button. 5a.2. System displays the available Proc Staff Members 5a.3. User selects a staff member and confirms 5a.4. The system gives the authority to the new user to Manage the selected PR line. <p>5b. User wants to take the authority to approve the PR on behalf of another Procurement Staff Member</p> <ol style="list-style-type: none"> 5b.1. User clicks the Supersede Authorization button. 5b.2. The system gives the authority to the new user to Manage the selected PR line. <p>5c. User wants to reject the PR</p> <ol style="list-style-type: none"> 5c.1. User clicks the Reject button.

	<p>5c.2. System prompts the user enter the Reject Reason and Reject Note.</p> <p>5c.3. User enters the Reject Reason and Reject Note.</p> <p>5c.4. System Rejects the PR and change the status from “To be Authorized” to “Rejected”</p> <p>5c.5. System sends a notification to the Site Manager who created the PR requisition.</p> <p>5d. User wants to print the PR</p> <p>5d.1. User clicks Print PR button.</p> <p>5d.2. System generates a PDF and prompts an email address</p> <p>5d.3. User enters the email address</p> <p>5d.4. System sends an email to the email address.</p> <p>5e. User wants to view all authorizers for the PR</p> <p>5e.1. User clicks View Authorizers button</p> <p>5e.2. System shows all the Authorizers from the selected PR</p>
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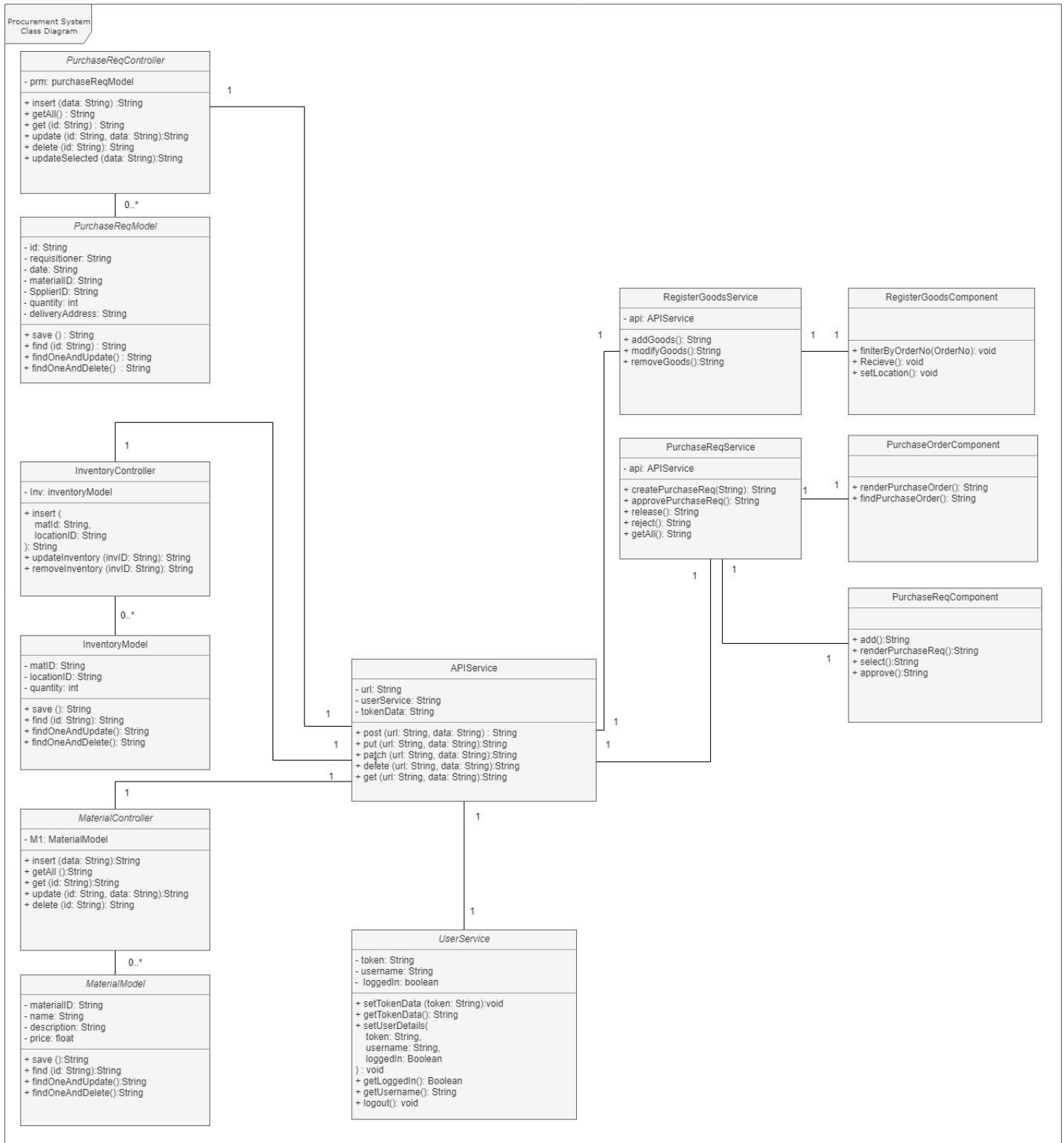
Use Case No	3
Use Case Title	Receive Goods from Supplier
Primary Actor	Warehouse Manager
Pre-conditions	Goods must be delivered to the site either partly or fully
Main Success Scenario	<ol style="list-style-type: none"> 1. User logs into the system 2. User navigates to the Purchase Order page 3. User finds the order by order reference (provided by the supplier) 4. User inspects the arrived goods quality and quantity against the PO 5. User navigates to the Register Arrived Goods page. 6. User finds the order by order reference (provided by the supplier) 7. User clicks Receive button. 8. System shows available location slots in the Warehouse 9. User selects a slot. 10. System allocates the new slot to the arrived goods 11. System changes the PO state from “Approved” to “Received”. 12. User feeds the invoice for the received goods to the system. 13. System forwards the invoice to the Accounting Department
Extensions	<p>4a. One or more parts have been damaged or missing during the shipment</p> <ol style="list-style-type: none"> 1. User enters the quantity to be returned. 2. User enters Reject Reason 3. User enters a Reject Note 4. System deducts the by Arrived Quantity by Returned Part Quantity for the PO 5. System prints the reject report to the user. <p>4a.5.1. User wants to claim the returned items as credit notes</p> <ol style="list-style-type: none"> 1. User clicks generate credit note. 2. System generates a credit note. <p>4b. The goods are delivered into multiple times</p> <ol style="list-style-type: none"> 1. User clicks the Split button

	<ol style="list-style-type: none">2. System prompts the user to enter the quantity to Split3. User enters the quantity to Split4. System splits the quantity to be received from quantity received according to the Split Quantity5. System creates a sub version of the Purchase Order for the quantity to split from the Original Purchase Order.
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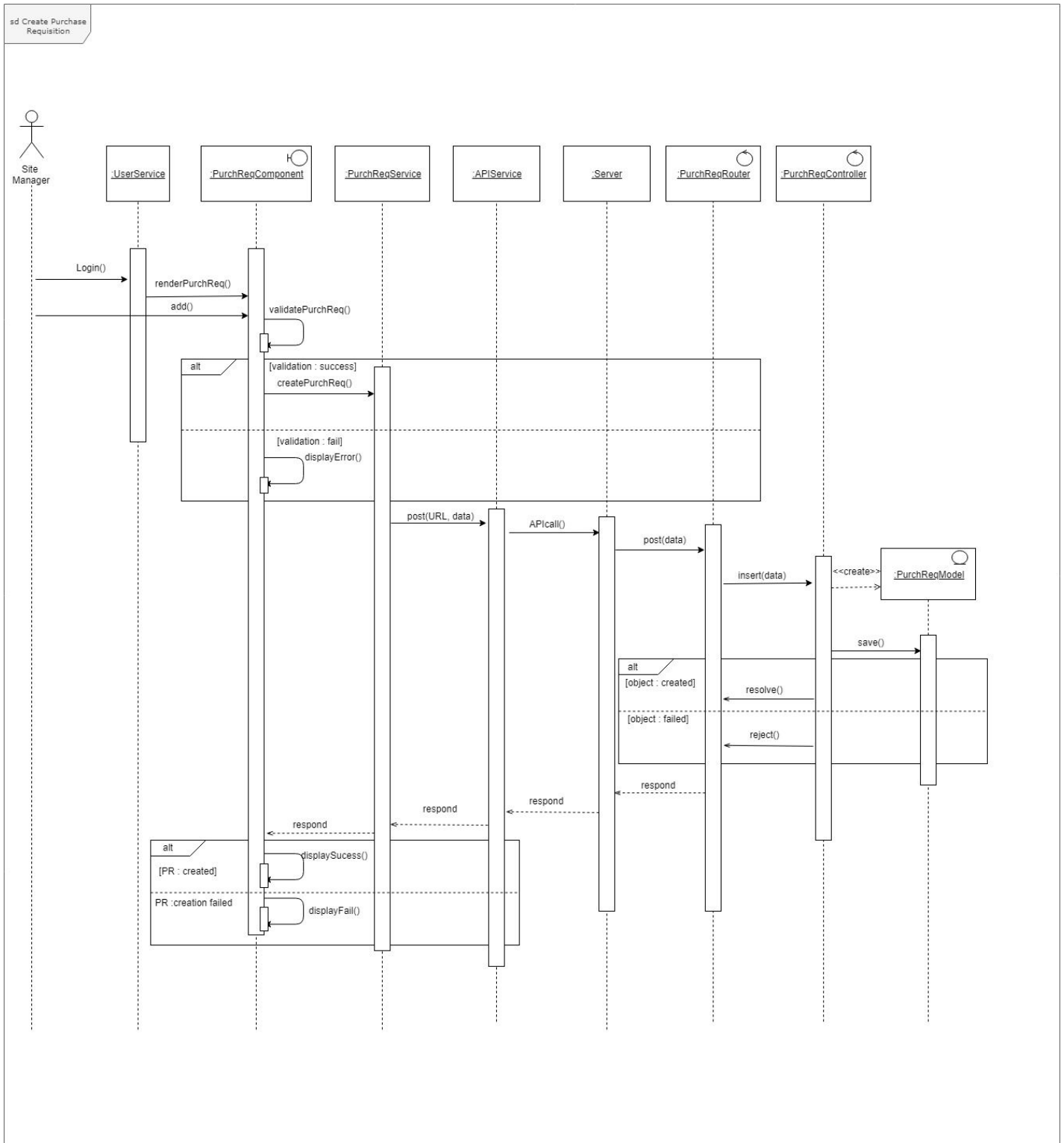
Use Case No	4
Use Case Title	Review Quotations
Primary Actor	Accounting Staff Member
Pre-Conditions	User should be properly authorized to use the system
Main Success Scenario	<ol style="list-style-type: none"> 1. User Login to the System 2. User navigates to the review quotations page 3. A list of available quotations from suppliers are loaded to the page 4. User clicks on one to view detailed quotation 5. User clicks on “Approve” button to approve the quotation 6. System prompts a window with unpriced items 7. User enters prices to the corresponding items 8. User clicks confirm button 9. System sends a notification to the supplier of the approval of his/her quotation
Extensions	<ol style="list-style-type: none"> 5.a. User hard rejects the quotation <ol style="list-style-type: none"> 5.a.1. User clicks on the “Hard Reject” button 5.a.2. System prompts a window to type in the rejection reason 5.a.3. User types the rejection reason 5.a.4. User clicks on the “Confirm” button 5.a.5. System sends a note to the supplier with the rejection reason 5.a.6. System prompts a list of alternative suppliers to send the quotation again 5.a.7. User selects one or more suppliers 5.a.8. User clicks on the “Send” button 5.a.9. System sends the quotation to the selected suppliers and remove the quotation from the rejected supplier and return back to the main listing of quotations <ol style="list-style-type: none"> 5.a.7.1. User clicks on the cancel button 5.a.7.2. System remove the quotation from the rejected

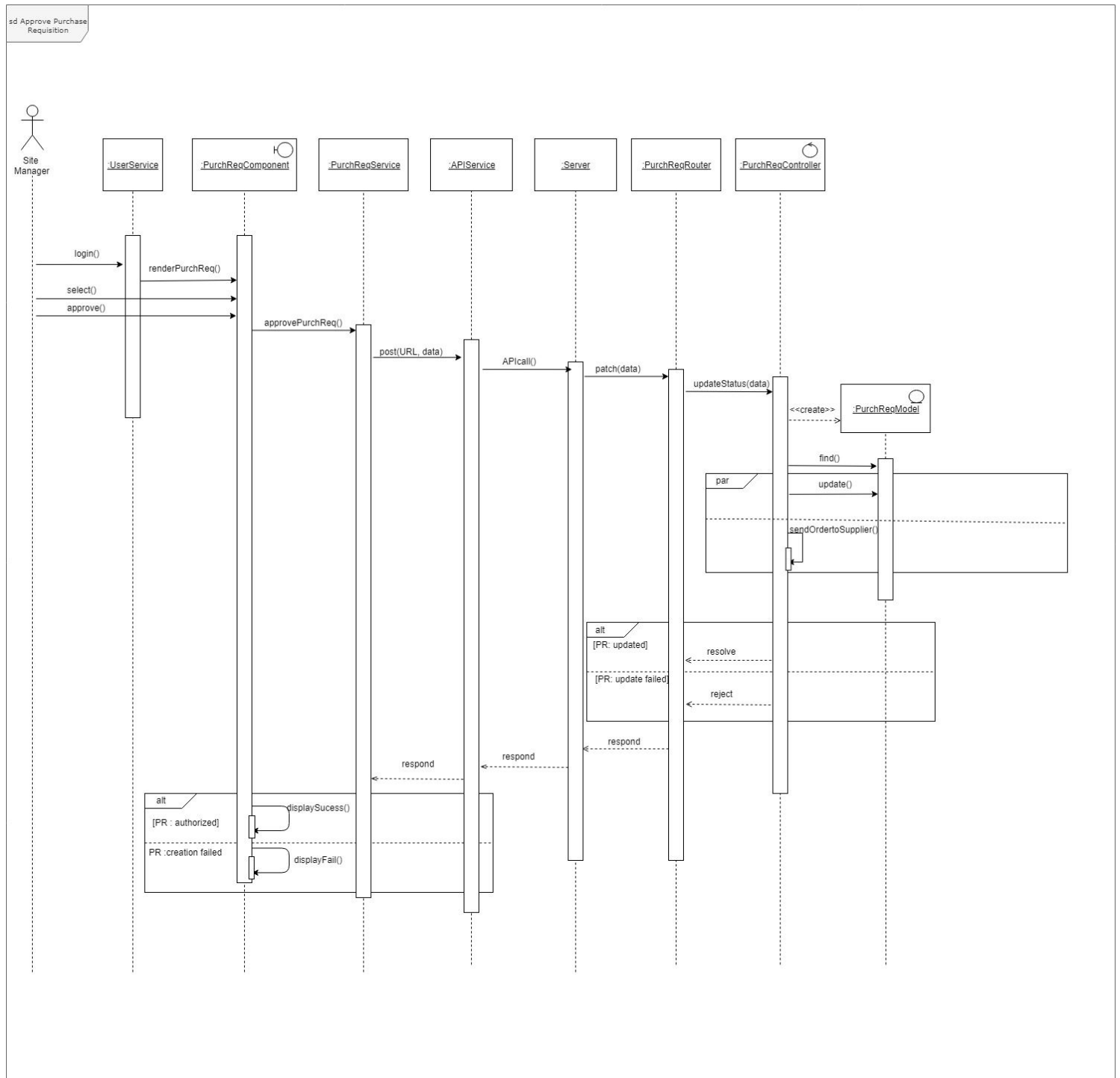
	<p>Supplier and return back to the main listing of Quotations</p> <p>5.b. User soft rejects the quotation (In cases such as some prices are acceptable, and some needs a reconsideration)</p> <p>5.b.1. User clicks on the “Soft Reject” button</p> <p>5.b.2. System prompts a window to type in the rejection reason</p> <p>5.b.3 User clicks on the ‘Submit’ button</p> <p>5.b.4 System send the quotation revision request to the supplier</p>
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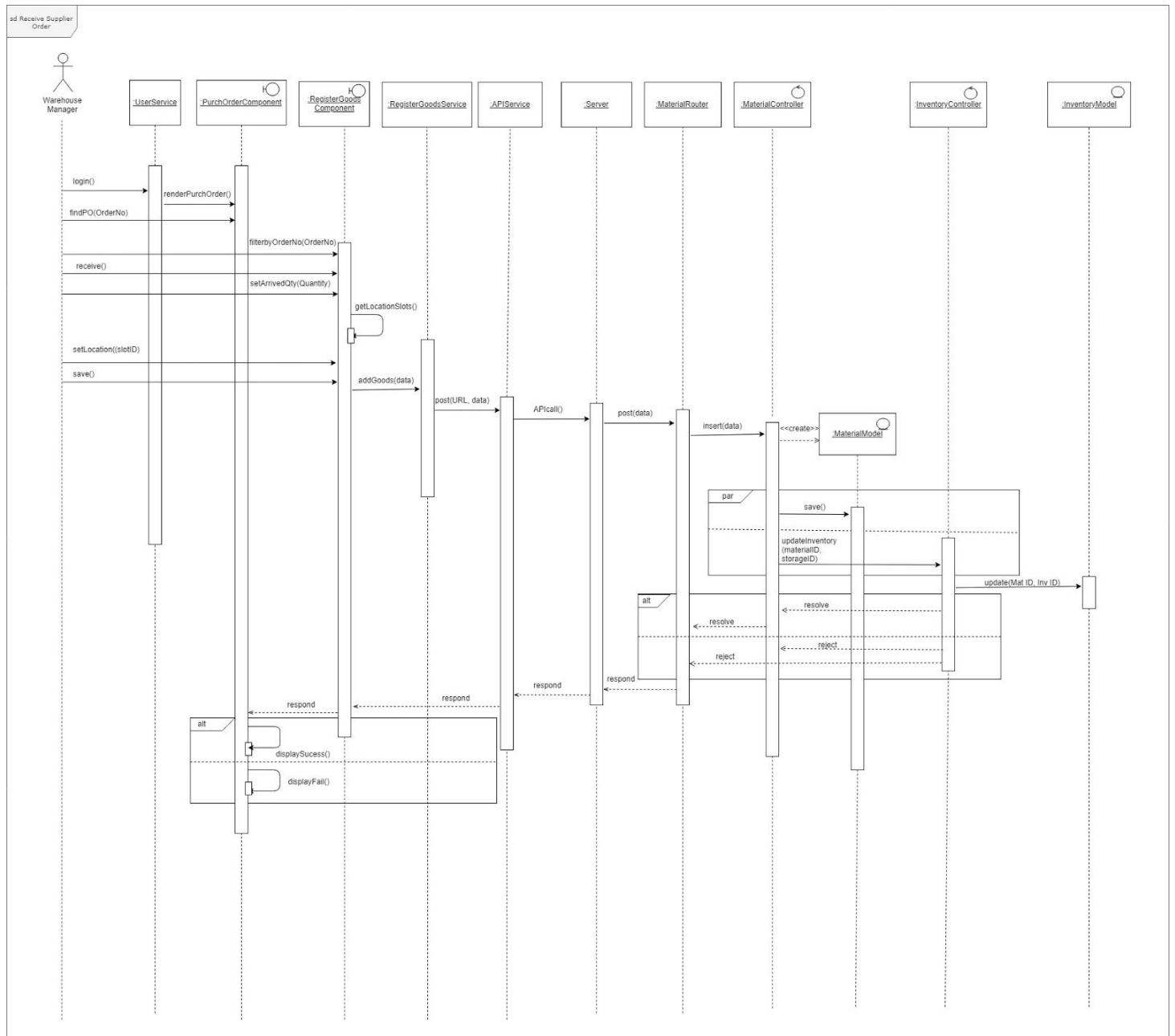
3. Class Diagram



4. Sequence Diagram







5. Low fidelity User Interaction Diagrams

5.1. Create Purchase Requisition Page

Material	Qty	Supplier
Ultratech Cement	300	Dharmasena OK 270000/-
Marble tiles	250	Dharmasena OK 25000/-
Director chair	5	Dharmasena OK 178000/-
Reception table	2	Dharmasena OK 115000/-
Glass Door	3	MTUT holdings 105000/-
Total		673000/-

Load previously saved draft as the new purchase order

Once the user clicks the add materials button, the following window pops.

This window is another application, which loads in the library of materials. As the user clicks on the materials, the supplier listing on screen right would also update.

This application also give access to material management tools such as add, remove or update existing material functions

Create PR button.
This create this purchase requisition if it needs approval or if not, release it to the selected supplier(s)

Save teh current settings as a draft, so that it can be used later as a template.

This table should dynamically update as the user adds in new materials/items

These are buttons with thumbnail images, so that it is clear for the user what he/she is picking.

This could especially useful in the mobile environment where the screen size is small

5.2. View Purchase Requisitions Page

The screenshot shows a web application for viewing purchase requisitions. The interface includes a sidebar with navigation links, a top navigation bar, and a main content area with a table of requisitions and a detailed view section.

View Purchase Requisitions

Filter:

Site	Requisition	Items	Total Price	Reviewer name	Reviewer note	Order	Status
<input type="checkbox"/> MAGA-001	12	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These are requested by the customer himself	ord-011	pending
<input type="checkbox"/> MAGA-001	24	Cement 1200packs Sand 340 cubes 7000Tiles 600Ceramic Glass	4569000/-	Suraweera S S	These seems to be overpriced	ord-034	pending
<input checked="" type="checkbox"/> MAGA-013	11	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	This supplier is currently suspended. Will be resolved	ord-041	Hold
<input type="checkbox"/> MAGA-014	16	Cement 1200packs Sand 800 cubes	478900/-	Munasinghe A B	Needs the approval ASAP	ord-033	Hold
<input type="checkbox"/> MAGA-001	74	Cement 1200packs Sand 800 cubes	478900/-	Dharmasena O	Approved with minimum margin of inspection	ord-112	Approve
<input type="checkbox"/> MAGA-001	36	Cement 1200packs Sand 800 cubes	478900/-	Dharmasena O	These are requested according to the security regulations	ord-046	Hold
<input type="checkbox"/> ACCESS-01	25	Cement 1200packs Sand 800 cubes	478900/-	Ranawake A G	Try to get the items delivered before two days as	ord-079	Approve
<input type="checkbox"/> ACCESS-01	26	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These are required immediately before easter	ord-004	pending
<input type="checkbox"/> MAGA-001	13	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These item prices are not properly verified	ord-093	Rejected
<input type="checkbox"/> ACCESS-01	17	Cement 1200packs Sand 800 cubes	478900/-	Dharmasena O	These are requested by the customer himself	ord-066	pending
<input type="checkbox"/> MAGA-001	48	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These items are too hazardous for the site	ord-031	Rejected

Site: MAGA-013
Items: Ultratex Cement
Manompiyis Sand
Qty: 1200 packs
800 cubes
price: 342700/-
106300/-
478900/-
Reviewer: Marcus F
Delivery Date: 22/08/2019
Order No: ord-041
Reviewer Contact No: 0777 377 899
Delivery Time: 11:00 Hours
Requisition No: 11
Supplier: Sirinena Hardware
Status: Hold
Delivery Address: No 77, Kirimandala Mawathe, Narahepita
Supplier Contact: 0777 839 820
0718 793 455
Reviewer Note: This supplier is currently suspended. Will be resolved soon
Supplier Address: No 999-A6, New Kandy Road,

The list of PRs (Purchase requisitions)

This list is loaded everytime user loads the page
It includes all the PRs which are active at the momet

This is the detailed information of a particular PR.

It is loaded when a user selects single or multiple PR(s)
from the list and click on the "View More Info" button. in
case when multiple PRs selected, tghis set of information
should be displayed for each of the selected PRs

Main Fucntions for "View PR"

- > **Filter:** Options to filter the PR (purchase requisition) list by status, site, reviwer total cost, order no etc
- > **Release:** Release or forward the selected purchase orders to the supplier
- > **Discard:** Delete the selected purchase orders from the system
- > **View more info:** View detailed information on the selected purchase orders
- > **Enable Notification:** Tell the system to send notifications when the selected orders change their state.
- > **Enable Notification:** Disable the option above

5.3. Approve Purchase Requisition Page

Site	Requisition No	Items	Total Price	Requisitioner name	Requisitioner note	Order Code	Status
MAGA-001	12	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These are requested by the customer himself	ord-011	pending
MAGA-001	24	Cement 7000packs Sand 340 cubes 7000Tiles 600Ceramic Glass Sheets	4569000/-	Suraweera S S	These seems to be overpriced	ord-034	pending
MAGA-013	11	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These are requested by the customer himself	ord-041	pending
MAGA-014	16	Cement 1200packs Sand 800 cubes	478900/-	Munasinghe A B	Needs the approval ASAP	ord-033	hold
MAGA-001	74	Cement 1200packs Sand 800 cubes	478900/-	Dharmasena O K	These are requested by the customer himself	ord-112	hold
MAGA-001	36	Cement 1200packs Sand 800 cubes	478900/-	Dharmasena O K	These are requested according to the security regulations	ord-046	hold
ACCESS-012	25	Cement 1200packs Sand 800 cubes	478900/-	Ranawake A G	These are requested by the customer himself	ord-079	pending
ACCESS-012	26	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These are requested by the customer himself	ord-004	pending
MAGA-001	13	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These are requested by the customer himself	ord-043	hold
ACCESS-012	17	Cement 1200packs Sand 800 cubes	478900/-	Dharmasena O K	These are requested by the customer himself	ord-066	pending
MAGA-001	48	Cement 1200packs Sand 800 cubes	478900/-	Marcus F	These are requested by the customer himself	ord-031	hold

The list of PRs (Purchase requisitions)

This list is loaded everytime user (CPO) loads the page

It includes all the PRs which are pending or on hold for approval

Main Functions for “Approve Purchase Request”

- > **Filter:** Options to filter the PR (purchase requisition) list by status, site, Requisitioner total cost, order no etc
- > **Approve:** Approve the selected PRs
- > **Reject:** Reject the selected PRs
- > **Print:** Print the selected PRs
- > **Supersede Authorization:** Acquire the authority to approve or reject the selected PRs from another CPO
- > **Forward Authorization:** Transferring your authority of approving or rejecting the selected PRs, to some other CPO. A list of other available CPOs will be prompted on the click of this button. Example case would be that if a one CPO about to take a leave, he/she can forward his/her authorization to some other available CPO so that the process will not be interrupted while the originally designated CPO is away
- > **View Authorizer:** View the designated CPO for the selected PRs

5.4. Receive Orders Page

Home Page

https://

Menu

Notification

Name

Receive Items

Order No: [View purchase order](#)

Order No.	Item Description	Total Price	Supplier	Wanted Receipt Date	Latest Order Date	Status
<input type="checkbox"/> ord-011	Cement 1200packs	674400/-	Samarasinghe Hardware	22/07/2019	22/07/2019	approved
<input type="checkbox"/> ord-024	Sand 800 cubes	287100/-	Matawa Hardware	22/07/2019	22/07/2019	approved
<input type="checkbox"/> ord-063	Cement 1200packs	478900/-	Samarasinghe Hardware	22/07/2019	22/07/2019	planned
<input type="checkbox"/> ord-012	35 CCTV Cameras	897700/-	Revalo Construction	22/07/2019	22/07/2019	planned
<input type="checkbox"/> ord-013	Cement 1200packs	409900/-	Revalo Construction	22/07/2019	22/07/2019	Processing
<input type="checkbox"/> ord-017	200 Pebble Cubes	909000/-	Revalo Construction	22/07/2019	22/07/2019	approved
<input type="checkbox"/> ord-031	Cement 1200packs	681200/-	Dharamasena OK	22/07/2019	22/07/2019	approved

Search the purchase order

When the supplier delivers the materials to the site he/she will present the order number to the warehouse manager. Then that number can be searched here and find the corresponding purchase order

View purchase order

View the details of the selected purchase order. This will open up the following window

Register Arrived Goods

Warehouse manager would verify the delivered items against this list in the system and click on this button to confirm the delivery

Home Page

https://

Menu

Notification

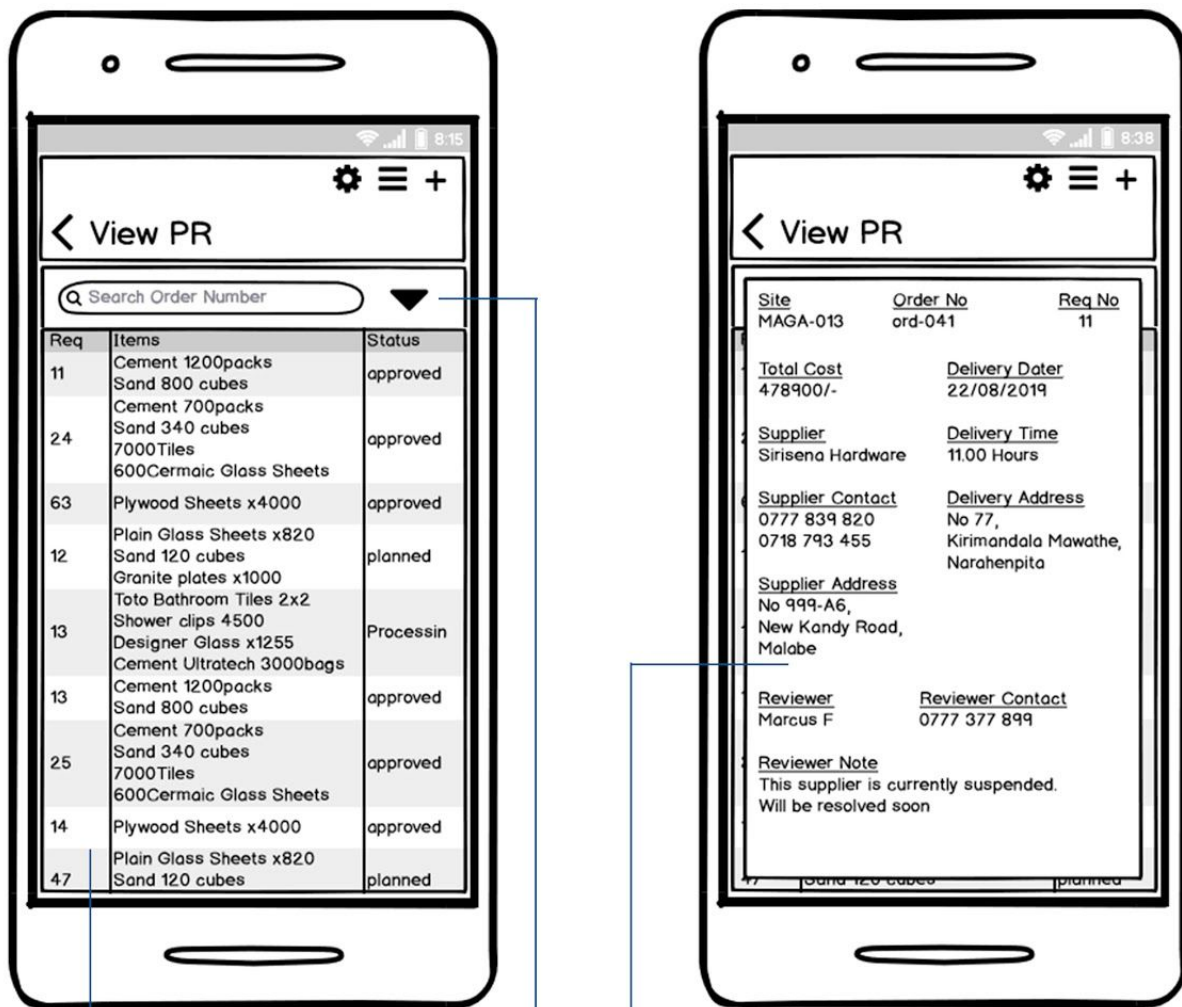
Name

Purchase Order

[Register Arrived Goods](#)

Part Number	Part Description	Unit Price	Quantity	Unit	Wanted Receipt Date	Latest Order Date	Status	Supplier
<input type="checkbox"/> 154	Ultratech Cement Pack	890.00	800	Bag	24/07/2019	19/07/2019	Planned	Revalo Construction
<input type="checkbox"/> 112	Sand Cube	400.00	200	Cube	24/07/2019	19/07/2019	Planned	Revalo Construction
<input type="checkbox"/> 153	Marbel Tiles	1350.00	1300	pcs	24/07/2019	19/07/2019	Planned	Revalo Construction
<input type="checkbox"/> 116	Plywood Sheets	480.00	1400	sheet	24/07/2019	19/07/2019	Planned	Revalo Construction
<input type="checkbox"/> 197	Bricks	80.00	2800	pcs	24/07/2019	19/07/2019	Planned	Revalo Construction

5.5. View Purchase Requisitions UI for Mobile application



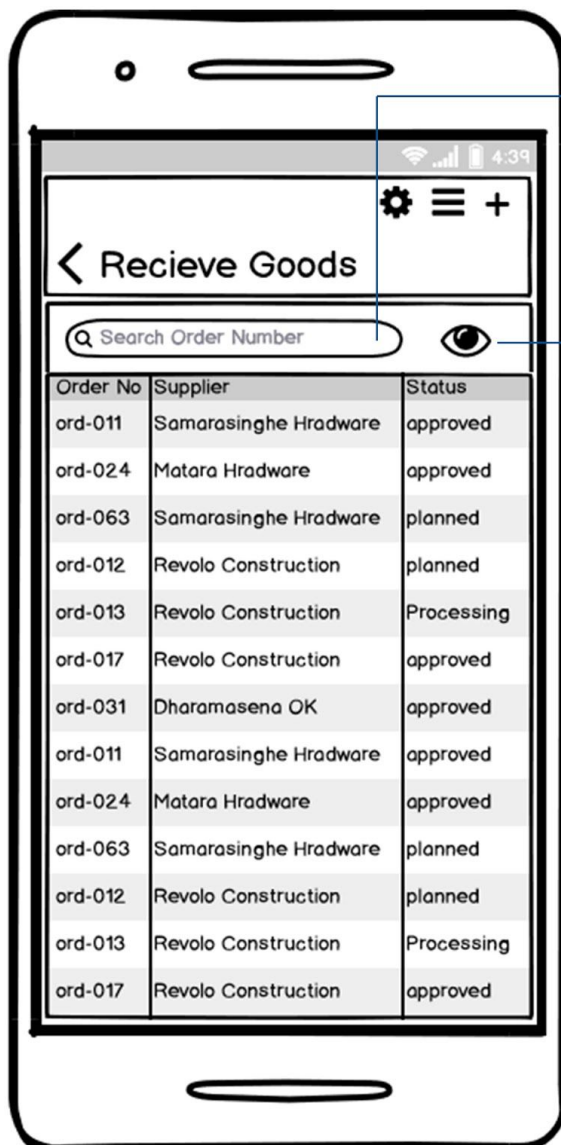
The list of PRs
(Purchase requisitions)
This list is loaded
everytime user loads
the page. It includes all
the PRs which are active
at the momet

This is the detailed information
of a particular PR.
It is loaded when a user selects single
or multiple PR(s) from the list and
choose the "View More Info" option.

Main Fucntions for "View PR", on the click of this icon

- > **Filter:** Options to filter the PR (purchase requisition) list by status, site, reviwer total cost, order no etc
- > **Release:** Release or forward the selected purchase orders to the supplier
- > **Discard:** Delete the selected purchase orders from the system
- > **View more info:** View detailed information on the selected purchase orders
- > **Enable Notification:** Tell the system to send notifications when the selected orders change their state.
- > **Enable Notification:** Disable the option above

5.6. Receive Orders UI for Mobile Application



Search the purchase order
When the supplier delivers the materials to the site he/she will present the order number to the warehouse manager. Then that number can be searched here and find the corresponding purchase order

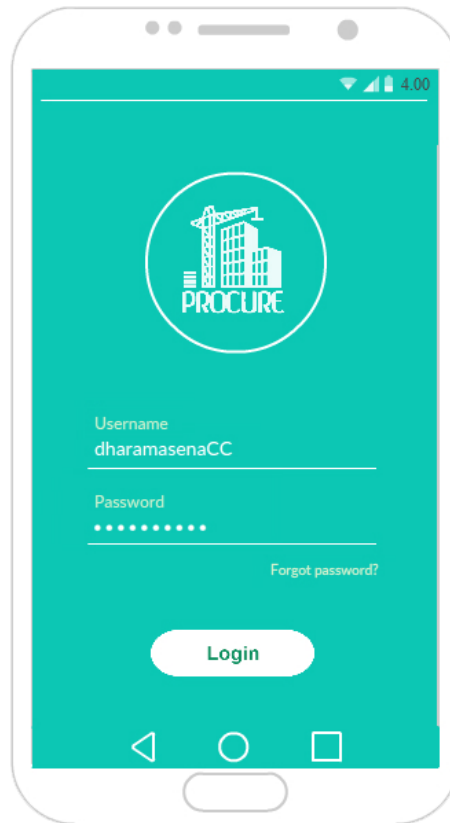
View purchase order
View the details of the selected purchase order. This will open up the following window.

The warehouse manager can then check the order against the delivered items and take further action

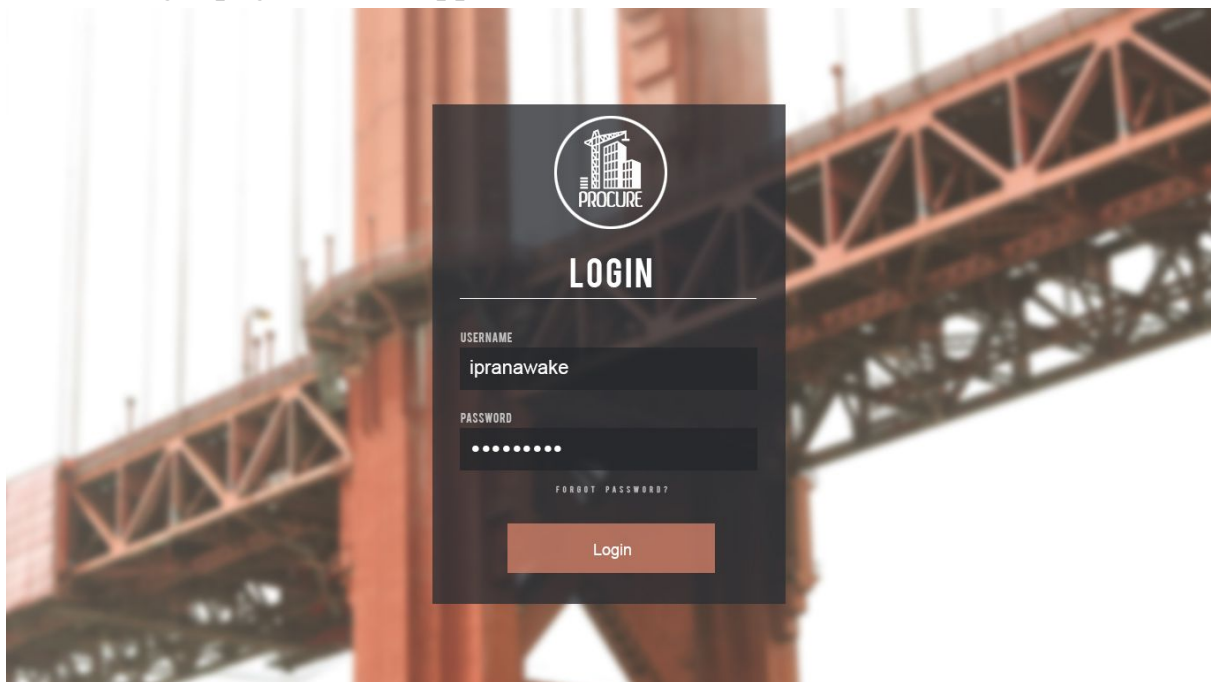
An icon instead of a descriptive name for the button is used to save screen space.

6. High fidelity User Interaction Diagrams

6.1. Login page for mobile application



6.2. Login page for web application



6.3. Approve Purchase Requisition for Mobile Application

