

جامعة جدة
University of Jeddah

University of Jeddah
College of Computer Science and Engineering
Department of Software Engineering

CCSW-223

**Project idea: Advanced Inventory Management System
(AutoStock)**

Professor: Wafa Ghonaim

Student Names:

Abdullah Fatani | 2441276
Anas Aboud | 2441295
Ziyad Al-Harbi | 2441402
Faisal Yasser | 2441188
Abdulrahman Al-Harbi | 2442029

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Introduction

Tracking a store's inventory can be a tedious task, and people struggled with it for as long as the market has existed, as people were very prone to making mistakes and miscalculations.

So, a system was created to help shop owners track their stock autonomously; by scanning the items sold and having them deducted from the stock count in the system, making the process of tracking items in the storage a lot simpler.

However, the system still lacking in one thing, restocking. Manually tracking the system to check for what items needs restocking proves to be a challenge due to the vast amount of items a store can provide. The system we are creating includes extra features that help resolve this problem.

Information gathering

We asked a bookstore employee about this issue; we will be sharing his feedback in this process.

Interview:

Interviewer Name: Abdullah Fatani ID: 2441276	Interviewee Name: Osama	Question 1: Do you currently use a digital system to help you manage your inventory?
	Job title: Storage manager at Jarir Bookstore	Answer 1: Yes, it would be difficult to manage the inventory without technological help.
	Phone: +966554491270	Question 2: How did using a digital system help?
	Interview date: 2024 – 10 – 24	Answer 2: We as humans are very prone to making mistakes, so using the power of technology, we can make sure the process is flawless
		Question 3: How does the system work?
		Answer 3: There is a database that contains all the products and their quantities, scanning an item at the cashier automatically deducts it from its respective position in the database.
		Question 4: What is the most common issue you face with the system?
		Answer 4: The only issue I can really think of might be maintenance downtime, it can hinder our work and put us behind in schedule, especially in ordering new stock from our suppliers, as there is still the delivery time to account for.
		Question 5: Are there any improvements you’d like to see in the current system?
		Answer 5: I would like if the system could also make restocking as convenient as keeping track of the current inventory, sometimes ordering new stock from the supplier can be a hassle and requires someone to constantly check on the storage.

Analyst comment:

We can conclude that an automated system helps greatly in a task heavily reliant on keeping track of numbers, however, they would also appreciate if the system could also operate on more tasks automatically.

Project Purpose:

A. The user business / background of the project effort

Content:

Our project is focused on diversifying the functions of modern inventory systems. Current systems for inventory tracking lack the ability to restock items on its own, resulting in delayed deliveries and upset customers. We aim to fix this issue by allowing the system to track the percentage of stock left for each individual item, and requesting more of that item from the supplier automatically upon detection of stock falling under 40%. Our goal is to help shop owners run their businesses more seamlessly without running into any hurdles.

Motivation:

The main reason we decided to choose this idea for our project was to make sure we never go through the frustration of driving to a store just to leave empty-handed as the product we wanted to purchase was out of stock.

Considerations:

As we are approaching 2030, our country's population keeps growing significantly, and having stock issues can result in big losses for businesses, as they are more prone to running out of the items people need due to higher demand. Automating the process of ordering more products is going to become a requirement to thrive in this growing economy.

B. Goals of the project

We're developing this system to make restocking easier and more efficient, in order to make sure a store is never out of a certain product.

Preliminary report

The problem:

The current problem with the system is its lack of the ability to re-order items to refill the shop's stock, to make the entire process be more seamless.

Findings:

Here are a few problems we found in the current systems that we aim to resolve:

- The process of ordering items is still manual, which is a lot less efficient than if the system does it automatically
- Some companies hire employees specifically for the purpose of ordering items for restocking, which results in higher employee costs
- A lot of customers are left unpleased when they find out the product they are looking to purchase isn't available

Proposed solutions:

- Automating the restocking process for more efficiency
- Implementing the ability to track current stock and judging if it requires restocking into the system, which removes the need for extra employees, reducing the costs
- Ensuring customer satisfaction by having an impeccable restocking system, managed automatically to avoid delays

Cost and schedule estimates:

The total budget is 2,000,000SAR

Estimated costs:

<i>Resources</i>	<i>Estimated cost</i>
Implementing costs	25%
System testing costs	10%
Management costs	30%
Maintenance costs	20%
Taxes	5%
Emergency expenses	10%

<i>Tasks</i>	<i>Estimated duration</i>	<i>Start date</i>	<i>End date</i>
Feasibility study	1 Month	01/11/2024	01/12/2024
Architectural design	1 Month	02/12/2024	02/01/2025
UML	10 Days	02/01/2025	12/01/2025
GUI	7 Days	12/01/2025	19/01/2025
Implementation	2 Months	20/01/2025	20/03/2025
Testing	1 Month	20/03/2025	20/04/2025

The Feasibility Study:

Technical Feasibility:

The auto-order feature can be integrated into the existing system using automation and linking the system to the supplier's system. Databases for both firms will have to be updated, an update will be made specifically to calculate and track the 40% threshold for each item and trigger automated orders. It is feasible to hire a team for these tasks given our 2,000,000SAR budget

Resource Feasibility:

Resources required for this enhancement include a development team to code, integrate, and test the auto-order feature, all resources are feasible in our budget.

Cost Feasibility:

Development costs are going to be minimal, given that we are only upgrading an already existing system. Maintenance costs are going to also be minimal, won't exceed the existing maintenance cost by much.

Market Feasibility:

We see no possible competition for our idea. As it is cost effective, since it will be worth it over manual employee labor in around 1-2 years, and because the idea is in theory very simple, which means that there is not much room for improvement. However, this is only true for our current time, new technologies might emerge in the future. For now, our system's biggest con might be that in case of a system error, it might cause a bigger issue than now, since people might become even more reliant on it.

Report writing:-

Problem definition:

The current system used by stores to keep track of their inventory lacks the ability to re-order items automatically, and doing this manually is inefficient and prone to mistakes and miscalculations; an issue in this process can have a snowball effect and cause long term deficiency.

Scope objectives of the new system:

Proposed system name: AutoStock

Objective: Our goal with this project is to simplify the process of restocking by automating it. Sometimes, there is just no space for error, like at bookstores at the "Back to school" rush, companies cannot afford to be out of stock. The proposed system ensures that you never run out of or miscount your stock.

Alternative solutions:

<i>Alternatives</i>	<i>Benefits</i>	<i>Drawbacks</i>
<i>Offer jobs exclusively dedicated to keeping track of stock and ordering new items manually</i>	<i>Faster to do, as it does not require editing the system</i>	<i>Costly, will not be worth it over the new system in the long run</i>
<i>Expand storages in size, so much that you are able to stack all products side by side, so counting becomes easier and faster for all employees</i>	<i>Storage becomes more user friendly to all employees</i>	<i>Will take a long time to build and renovate</i>

Software Impacts:

A system that keeps track of inventories already exists, however, it lacks the feature of restocking; so, we will be editing the already existing system and implementing the new function.

Potential changes to the organization:

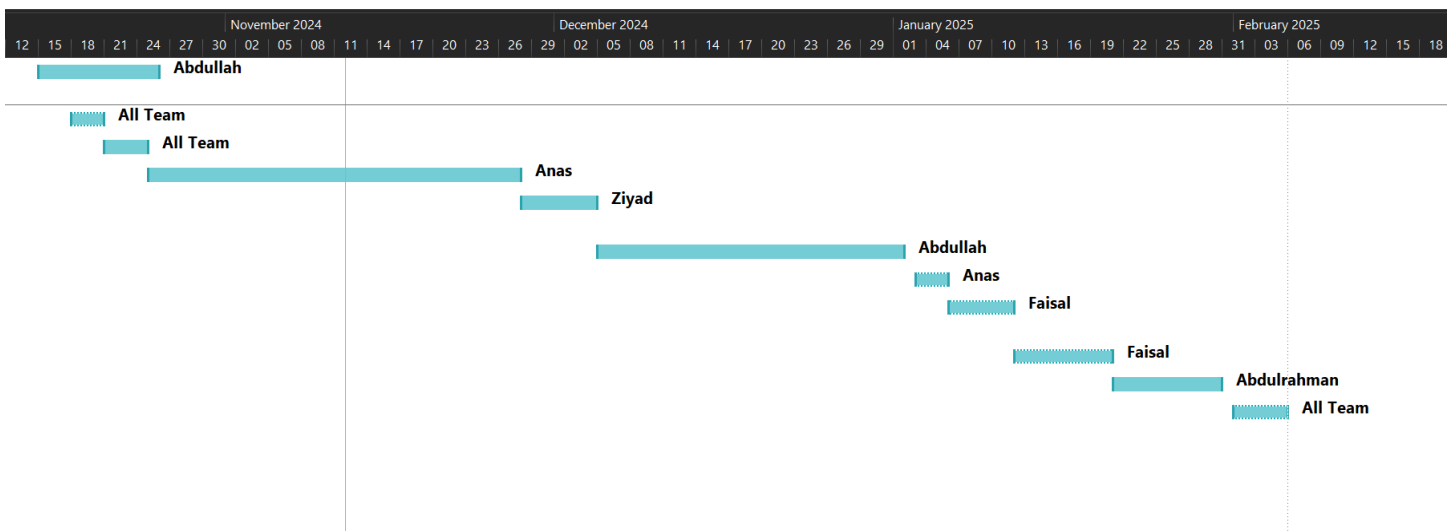
The new system's purpose is to automate the process of restocking, and this might take up some employees' roles, which in result will also cut costs by reducing the number of salaries paid. The system will also ensure that items are always properly stocked.

Recommended alternative course of action:

We recommending opting for the first alternative offered above – offering jobs dedicated to fulfilling the task of keeping inventory stock. While this is more expensive than the system, it is the best alternative solution as it will not halt the entire store like the second alternative would.

Project plan:

Task Mode ▾	Task Name ▾	Duration ▾	Start ▾	Finish ▾	Resource Names ▾
★	Project specifiiction and planning	9 days	Tue 15/10/24	Fri 25/10/24	Abdullah
★	Define resources	2 days	Fri 18/10/24	Sun 20/10/24	All Team
★	Define specifiaction	4 days	Mon 21/10/24	Thu 24/10/24	All Team
★	Feasibilty study	24 days	Fri 25/10/24	Wed 27/11/24	Anas
★	Develop functional specification	5 days	Thu 28/11/24	Wed 04/12/24	Ziyad
★	Acrhitectural design	20 days	Thu 05/12/24	Wed 01/01/25	Abdullah
★	System prototype	2 days	Fri 03/01/25	Sun 05/01/25	Anas
★	Unified Modeling Language	6 days	Mon 06/01/25	Sat 11/01/25	Faisal
★	Graphical User Interface	7 days	Sun 12/01/25	Mon 20/01/25	Faisal
★	Implementation	8 days	Tue 21/01/25	Thu 30/01/25	Abdulrahman
★	Testing	4 days	Sat 01/02/25	Wed 05/02/25	All Team



Stakeholders:

The client:

Shop owners and managers

The customers:

Shop customers

Other stakeholders:

Other shop owners willing to buy the new system from the original client

Scope:

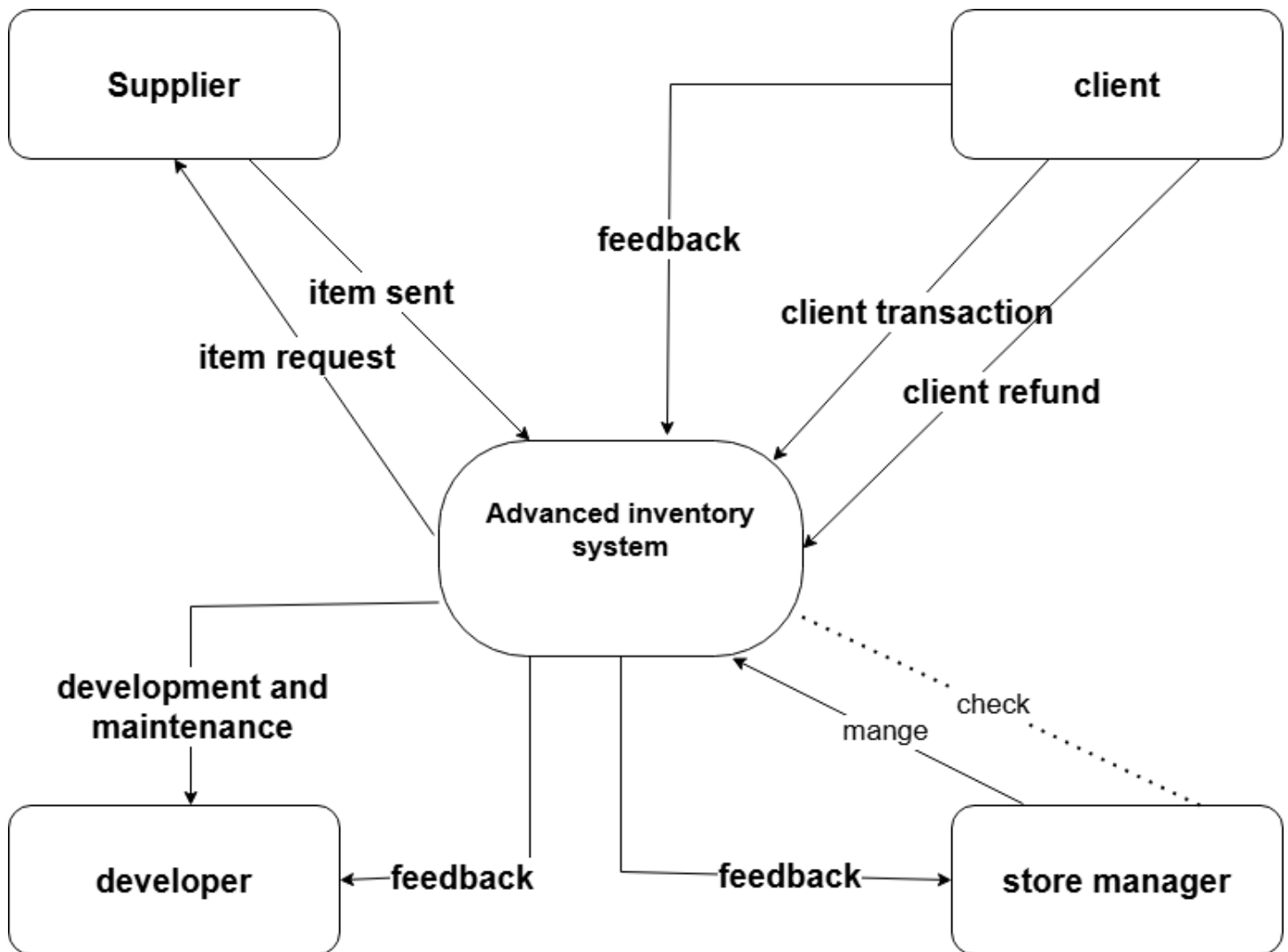
Current situation:

The currently existing system for shop storages and inventories lacks the seamlessness of restocking our system aims to provide, which can sometimes result in a dissatisfactory shopping experience when customers cannot find what they want.

Motivation:

Enhancing the workflow in stores and shops, the system will make the process of supplying the items to the shops flawless, seamless, and most importantly, instant.

Context diagram



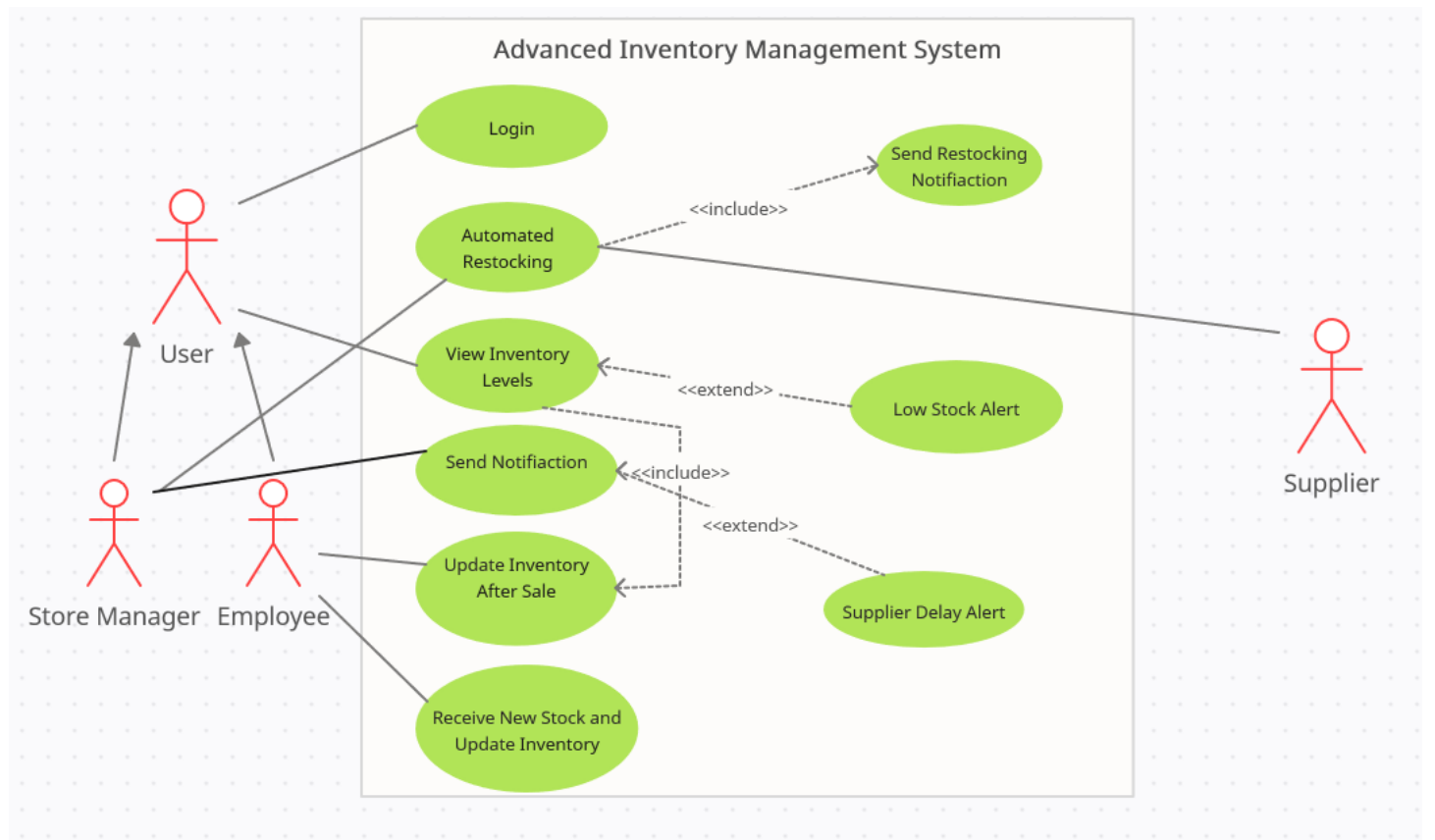
Event table

<i>Event Name</i>	<i>Input/Output</i>	<i>Summary</i>
<i>Login</i>	<i>Input</i>	<i>Employees and administrations input their info</i>
<i>Current stock info insertion</i>	<i>Input</i>	<i>Employees insert the current stock initially</i>
<i>Inventory tracking</i>	<i>Output</i>	<i>The system displays the info of the storage</i>
<i>Stock increase</i>	<i>Input</i>	<i>Items received from supplier are added</i>
<i>Stock decrease</i>	<i>Input</i>	<i>Items scanned at cashiers are deducted</i>
<i>Stock calculation</i>	<i>Output</i>	<i>Updated stock count updates and shows on employees' screens</i>
<i>Requesting new supply</i>	<i>Output</i>	<i>Stock request sent to supplier</i>

Functional and Non-functional requirements

<i>Functional Requirements</i>	<i>Non-Functional requirements</i>
<i>The system shall allow staff personnel to log in and access the inventory info</i>	<i>The system shall respond to any login attempts within 1 second</i>
<i>The system shall update the stock count upon customer purchase</i>	<i>The system must display items in groups of 100</i>
<i>The system shall update the stock count upon refunds</i>	<i>The system must be able to contain at least 1000 items</i>
<i>The system shall request new stock from the supplier</i>	<i>The system shall detect items with stock under 40%</i>
<i>The system must allow admins and developers to modify it</i>	<i>The system shall not have a downtime longer than 5 seconds per week</i>

Use case diagram

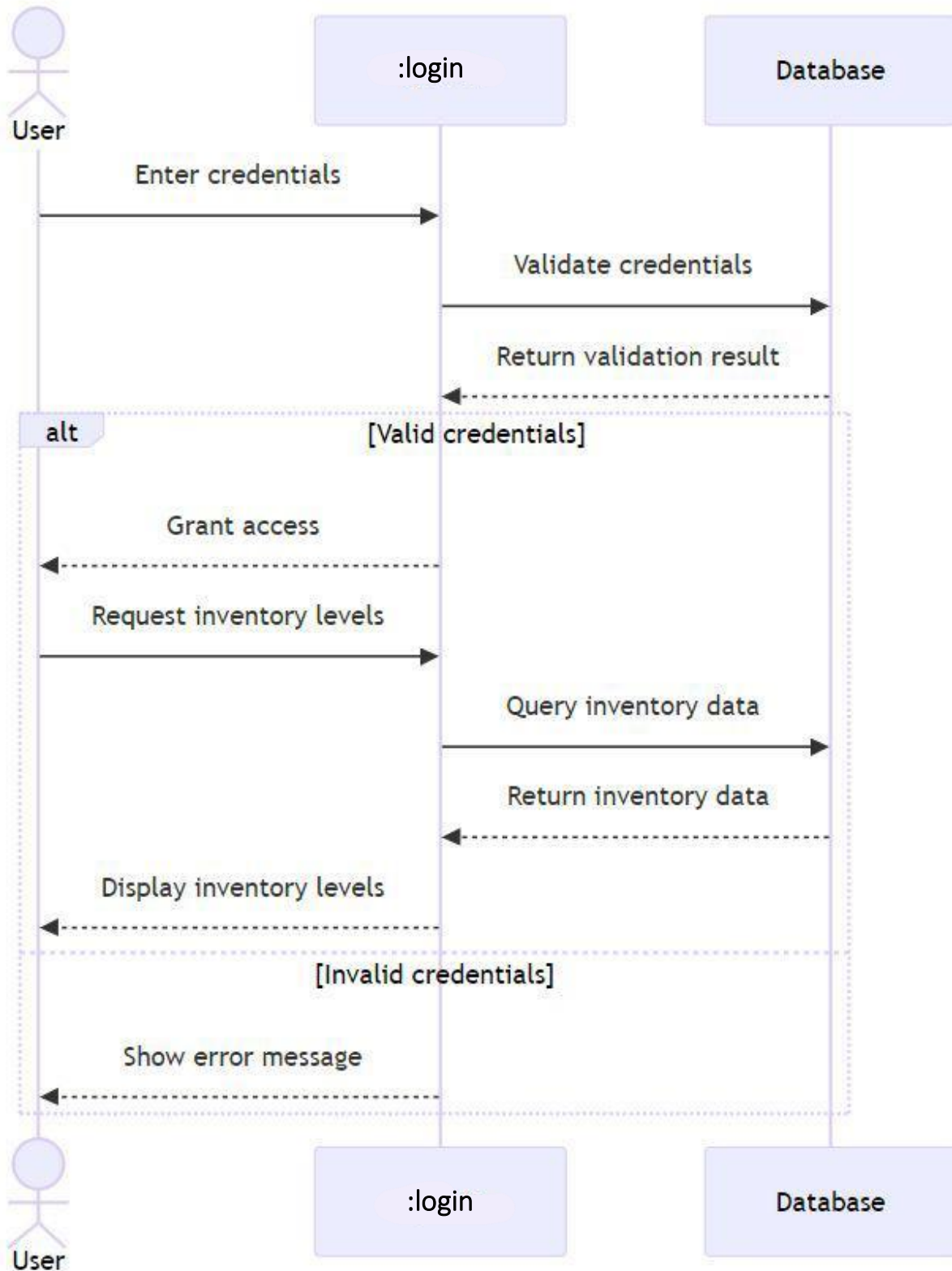


Scenarios

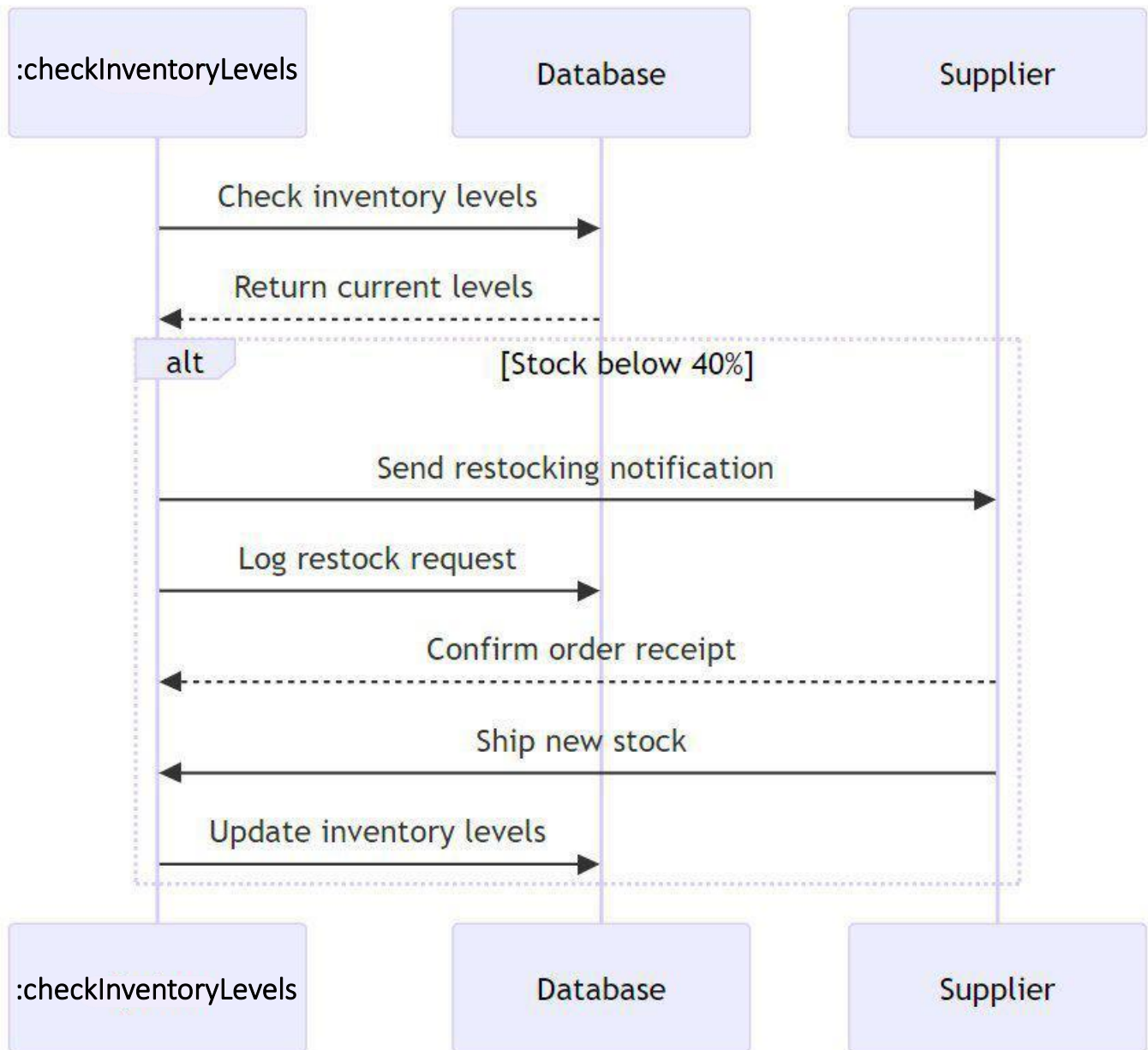
Name	ID	Actors	Precondition	Processes
<i>Log in</i>	<i>P1</i>	<i>Administrator Employee</i>	<i>None</i>	<i>Step 1: Open app Step 2: Insert details Step 3: Press enter</i>
<i>View Items</i>	<i>P2</i>	<i>Administrator Employee</i>	<i>Logged In</i>	<i>Step 1: Click on “Main menu” Step 2: Click “Inventory”</i>
<i>View stock Amount</i>	<i>P3</i>	<i>Administrator Employee</i>	<i>Logged In</i>	<i>Step 1: Select desired item Step 2: Click on the 3 dots Step 3: Select “Stock”</i>
<i>Register New Item</i>	<i>A1</i>	<i>Administrator</i>	<i>Logged In</i>	<i>Step 1: Click on “item list” Step 2: Click the plus sign Step 3: Enter item info</i>
<i>Delete Item</i>	<i>A2</i>	<i>Administrator</i>	<i>Logged In</i>	<i>Step 1: Click on “item list” Step 2: Hover over item Step 3: Click “X”</i>
Confirm Delivery	<i>P4</i>	<i>Administrator Employee</i>	<i>Logged In</i>	<i>Step 1: Select “Deliveries” Step 2: Click the checkbox for “received”</i>
Log out	<i>P5</i>	<i>Administrator Employee</i>	<i>Logged In</i>	<i>Step 1: Click on “Profile” Step 2: Select “Sign out”</i>

Sequence diagram

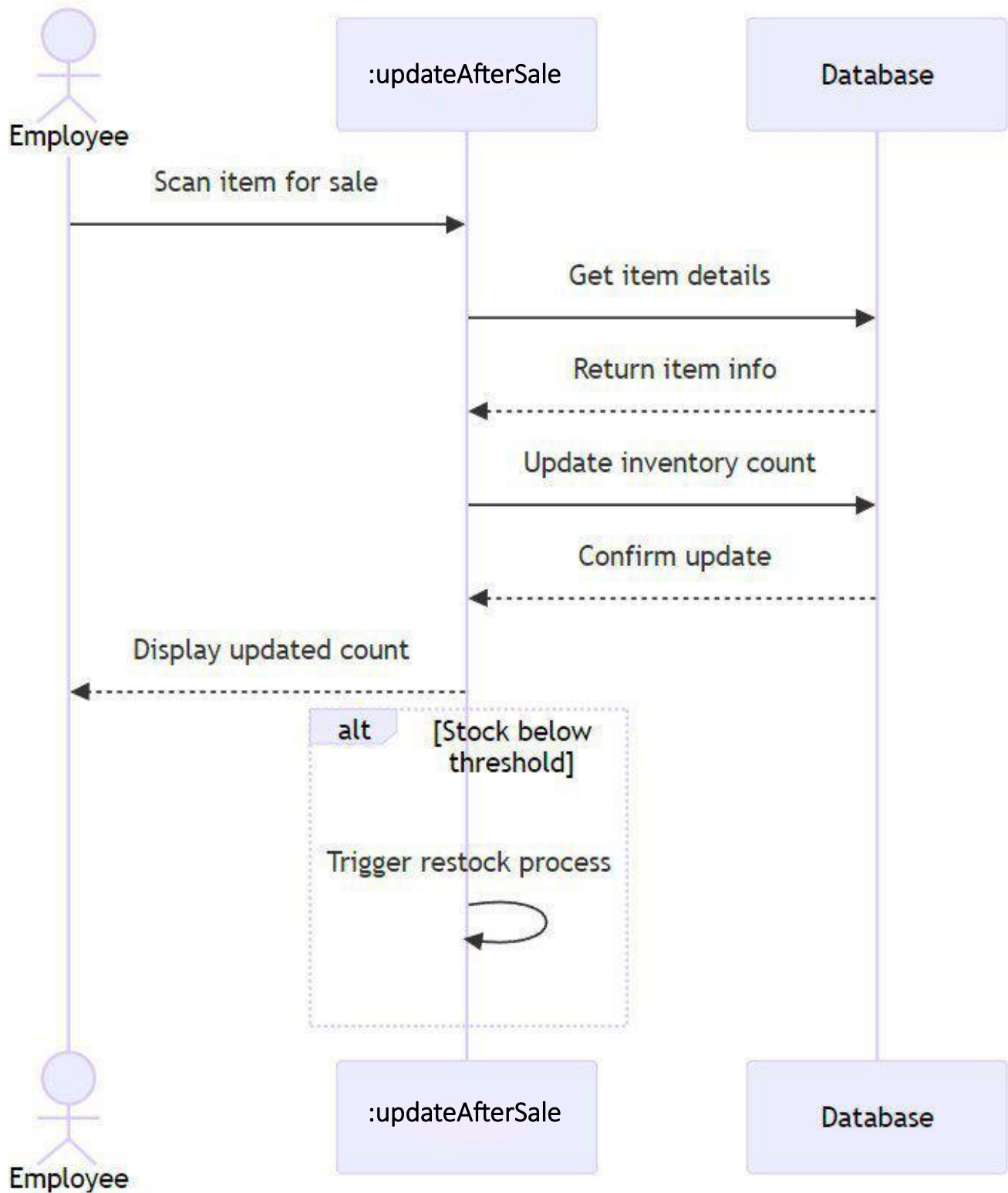
Login and Inventory View Sequence



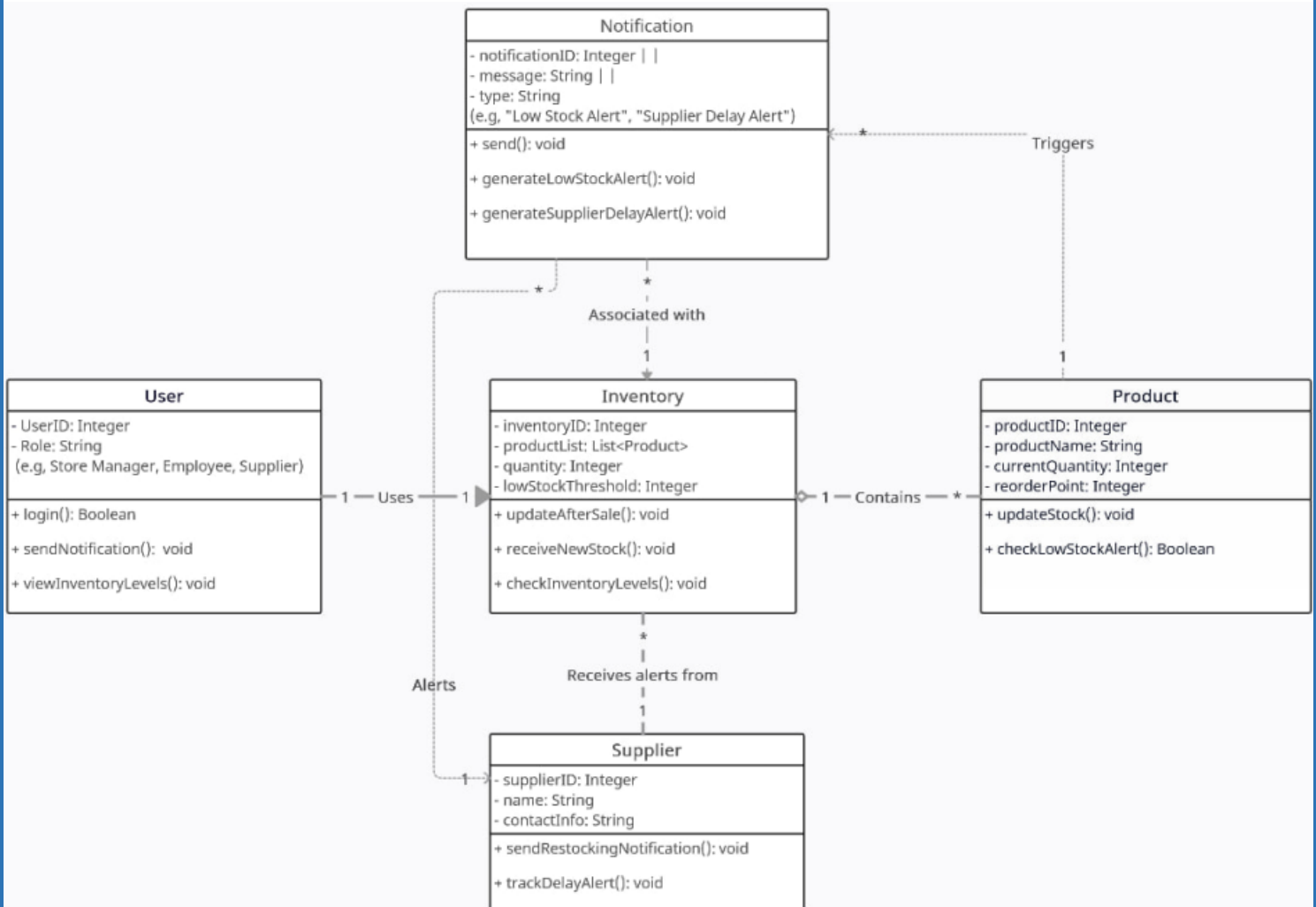
Automated Restocking Sequence



Sales and Update Sequence



Class diagram



Conclusion

The system we propose is an improvement of an already existing system, inventory tracking systems. By automating the restock-ordering process, we hope to enhance the experience for shop owners, and make sure there is never a shortage in their stock. As we grow in population, demand will grow, making this a crucial improvement to the current system. The system will be able to make sure all shops are stocked seamlessly, and ensures that no customer ever leaves out the door with the unsatisfaction of being told the desired product he/she wanted is out of stock.