

CPT203
Coursework 1

2024/2025 Semester 1
2024.11.8

Group number: 4

Student 1 Name: Yize Liu Student 1 ID: 2254472 who submits this coursework on the learning mall

Student 2 Name: Shengtian Huang Student 2 ID: 2254461

Student 3 Name: Qing Qin Student 3 ID: 2254084

Student 4 Name: Xu Chen Student 4 ID: 2257453

Student 5 Name: Zichen Qiu Student 5 ID: 2252705

Part 1: System requirements modelling (50 marks and no page limits)

1. Produce a use-case description for “Stock Receiving” and “Pack Order” use cases. (10 marks).

(1) **Use-Case Name:** Stock Receiving

Actors:

Primary Actor: Warehouse Clerk

Preconditions:

- The system should be operating normally, the warehouse staff's operating devices are connected to the network, the network is stable, and the devices are compatible with system page display and interaction.
- Warehouse employees have valid system credentials.
- Warehouse clerk is logged into the system.
- The system has recorded the incoming replenish order.
- The current date is within the valid receiving period of the replenishment order, the time interval between order creation and receipt is reasonable, and the information has been synchronized to the warehouse end.
- When the stock of a title falls below the reorder limit, a replenish order is created for that title.
- The publisher has delivered the requested book to the warehouse.

Postconditions:

- ❖ The system updates the inventory quantity of received books, marks the replenishment order as 'Received', sends confirmation notifications as appropriate, and displays real-time updated inventory information and receipt status on both warehouse and management interfaces.
- ❖ The system confirms receipt is complete, checks customer backlog inventory and prepares for future customer orders.

Main Success Scenario/Basic Flow:

1. The warehouse clerk receives the replenish order from the publisher.
2. The warehouse clerk logs into the system and selects the “Stock Receiving” function via their web interface.
3. The list of pending replenishment orders is displayed.
4. Warehouse staff select the replenishment list corresponding to the newly issued stock.
5. Warehouse personnel verify and confirm details of the replenish order.
6. The warehouse clerk enters the details of the replenish order and confirms its receipt.
7. The system adds the quantity of books in the replenish order to the inventory. And the system also checks the inventory. If the inventory is lower than the threshold, a warning is displayed.
8. The warehouse clerk verifies the information and submits the form.
9. The system updates the inventory and generates an update report.
10. The system notifies the order that is waiting for replenishment.

Exception Scenario:

◆ Step 2: Authentication Failure Pathway

When authentication verification fails:

2a. System generates authentication failure notification

2b. Upon selecting "Password Recovery":

 Recovery protocol initiates via email channel

 User establishes new security credentials

 Re-authentication attempt proceeds

2c. Following successful verification:

 Process continues to primary workflow (Continue to step 3)

Alternative outcome:

 Return to authentication interface

◆ Step 4, if warehouse staff realizes they have selected the wrong replenishment order:

- 4a. Warehouse staff can reselect the correct order before clicking 'Confirm Receipt'.
 - 4b. The system updates the interface to display the newly selected order information, ensuring warehouse staff can reconfirm the operation is correct, continue from step 5.
- ◆ Step 5, if warehouse staff discovers discrepancies between the order details and the actual delivered books (quantity or titles):
- 5a. Warehouse staff suspends confirmation, marks the order as 'Exception', and notifies managers or suppliers.
 - 5b. The system records the exception order and generates a report, pending verification and processing by managers or suppliers, and the process ends.
- ◆ Step 8, if the system fails to correctly increase inventory due to data update errors:
- 8a. The system displays an error message and temporarily locks the inventory data to prevent incorrect operations.
 - 8b. Warehouse staff contacts technical support, and after technical support resolves the issue, the system automatically retries the inventory update, continuing from step 8.

Alternate Scenario:

- Step 3: Warehouse staff wants to quickly organize all delivered replenishment orders
 - 3a. Warehouse staff selects the "Quick Filter" option, and the system automatically filters all replenishment orders marked as "Delivered" into a separate temporary directory.
 - 3b. The system displays all delivered orders in this temporary directory for warehouse staff to quickly browse and perform batch operations.
 - 3c. After confirming the order information, warehouse staff can proceed with batch receiving or other related operations.
- Step 4: Warehouse staff adds annotations to replenishment order details before confirmation
 - 4a. Before order confirmation, warehouse staff can add annotations in the system (such as order quality or special instructions).
 - 4b. The system saves the annotation information and links it to the order record for future query or review.
 - 4c. After confirming the information, warehouse staff proceeds with the next operation.
- Step 7: Managers want to manually adjust inventory thresholds
 - 7a. After the system checks inventory, warehouse staff selects the "Adjust Threshold" option.
 - 7b. The system allows managers to adjust inventory warning thresholds or replenishment quantities to ensure alignment with actual needs.
 - 7c. After managers confirm the adjustment, the system updates the thresholds and applies them to subsequent inventory monitoring.

(2) Use-Case Name: Pack Order

Actors:

Primary Actor: Warehouse Clerk

Preconditions:

- Warehouse employees have valid system credentials.
- Warehouse clerk is logged into the system.
- Customer orders have been created in the system.
- Customer orders have not been cancelled.
- Each book has a set minimum inventory level (reorder limit), and supplier information has been configured.
- The system's notification and communication functions are operating normally to enable timely notifications of inventory updates and replenishment needs.

- The system has recorded the customer order and there is sufficient stock of the ordered books.

Postconditions:

- ◆ The selected order is packed.
- ◆ The packed books are prepared for shipping in the warehouse.
- ◆ The order status in the system is updated to “Packed (Ready for Shipment)” .
- ◆ The inventory of each heading is reduced according to the quantity of packaging.
- ◆ If the inventory falls below the threshold, the system generates a replenishment order.
- ◆ Send the ship-ready order to the dock for shipping.
- ◆ The system generates complete packing operation logs for subsequent tracking and auditing.

Main Success Scenario:

1. Warehouse employees log in to the system and access the "Pack Order" section on the web page.
2. The warehouse clerk retrieves the packing task from the system.
3. The warehouse clerk selects an order to pack, and the system displays the order details, including the name and quantity of the item required for the order.
4. The system automatically checks the inventory status of each book in the order, ensuring stock levels meet order requirements (partial packing is not allowed).
5. The warehouse clerk picks the books from the shelves and packs them.
6. The warehouse clerk confirms in the system that the order has been packed and records the completion time.
7. The system updates the inventory by deducting the quantity of each packaged item.
8. The system updates the order status to “Packed and Ready for Shipment” .
9. The warehouse clerk places the packed order in the shipping area.

Exception Scenario:

◆ Step4:Inventory Availability Exception:

When requested volume exceeds storage capacity:

4a.Alert mechanism activates: "Storage threshold exceeded for [Name]"

4b.Upon inventory deficit confirmation:

 Order classification shifts to "Supply Pending"

 Leadership notification protocol initiates

 Dispatch documentation undergoes real-time adjustment

4c.Processing suspension maintains until inventory replenishment occurs.

◆ Step5:Incorrect Item Picked

5a.If the warehouse clerk picks an incorrect item from the shelves, then:

5b.The clerk discovers the error upon checking the order details.

5c.The warehouse clerk selects "Report Item Error."

5d.The system prompts for the correct item details.

5e.The warehouse clerk updates the packing list with the correct item.

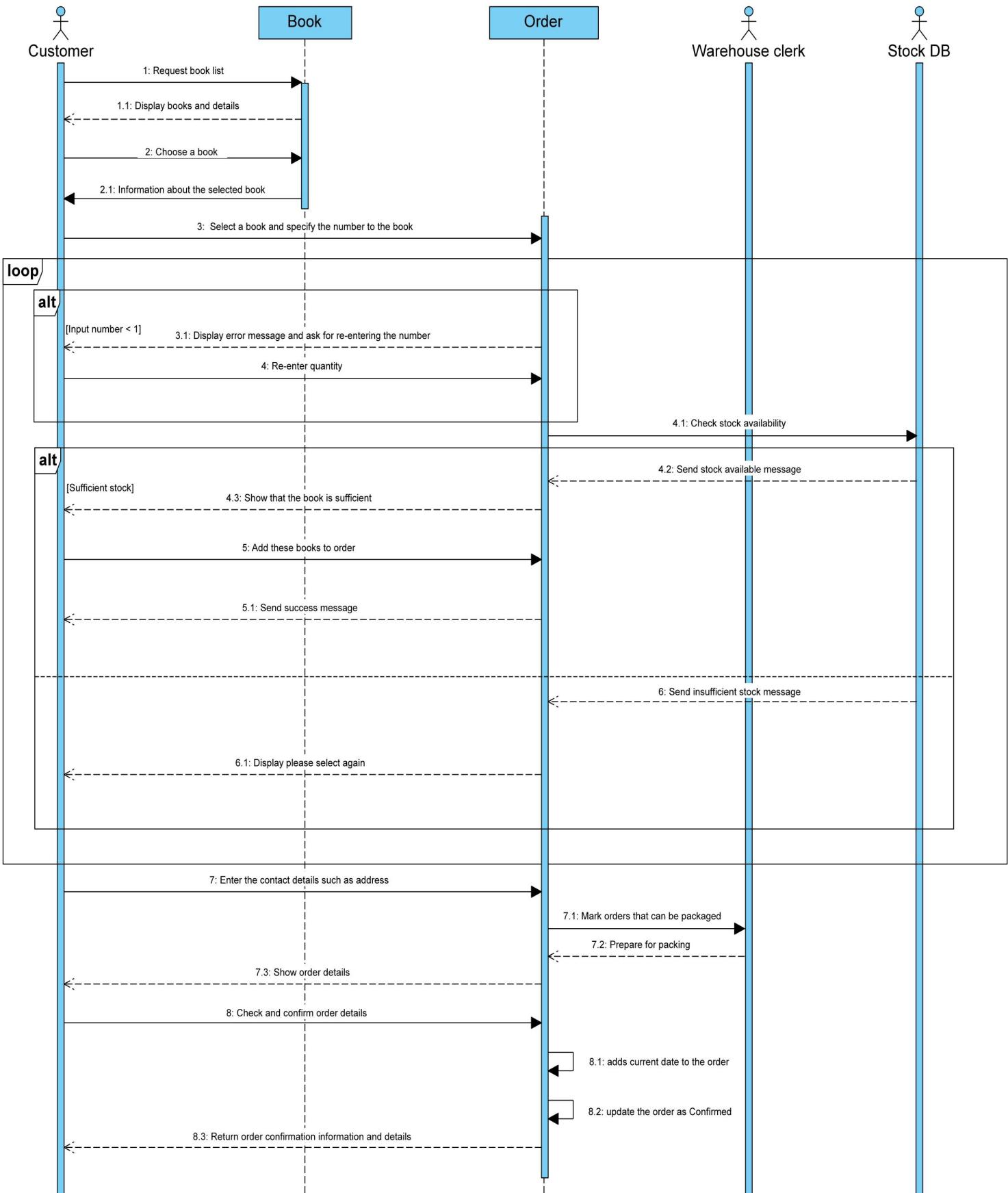
5f.The system generates a notification about the discrepancy.

Alternate Scenario:

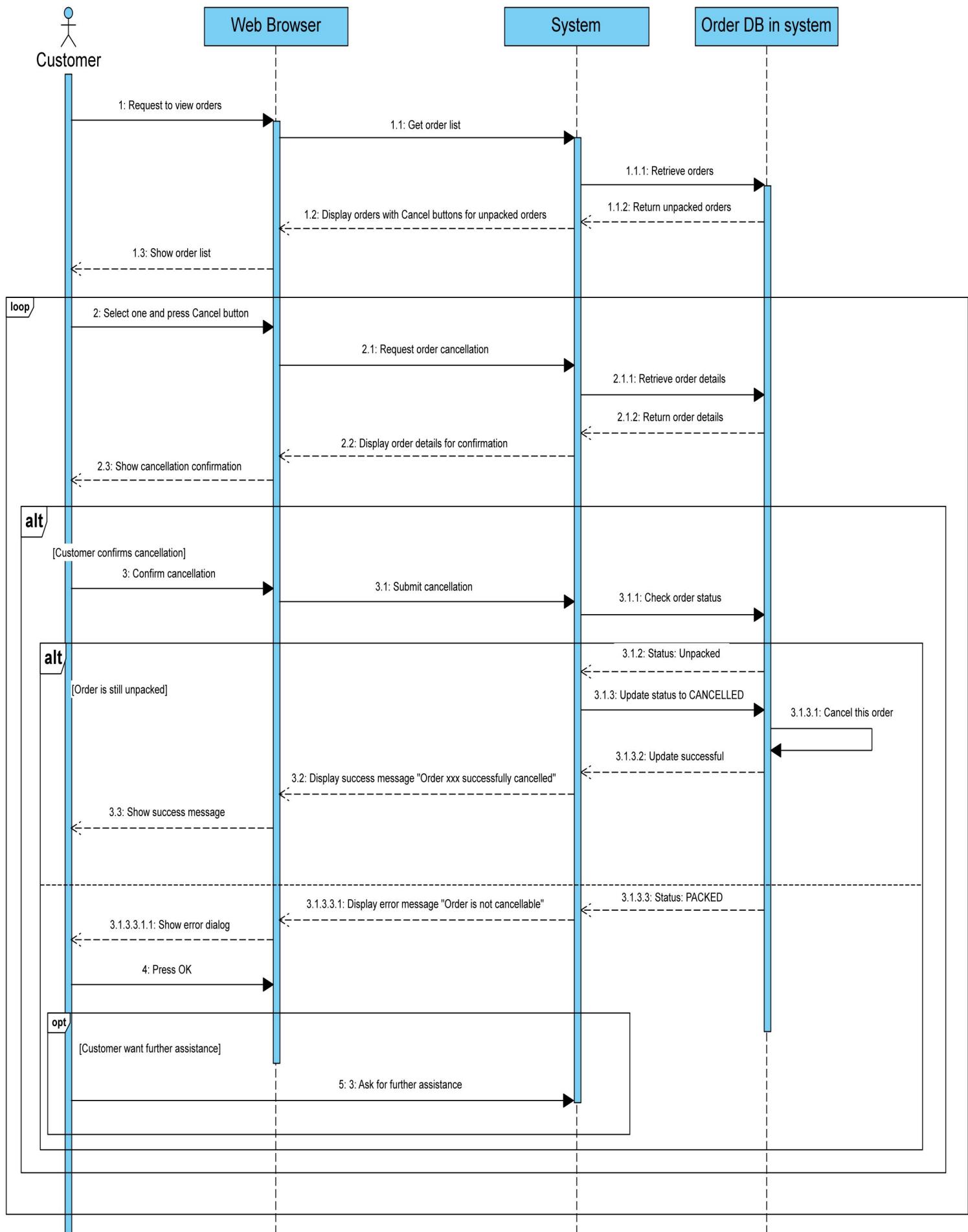
- Step 6: If warehouse staff wants to print order details as packing records simultaneously:
 - 6a. Before clicking the "Mark as Packed" button, warehouse staff selects the "Print Order" function, and the system generates printable order information.
 - 6b. Warehouse staff archives the printed order information as packing documentation, then clicks the "Mark as Packed" button.
 - 6c. The system continues to update the order status and sends shipping notifications.
- Step 8: If warehouse staff wants to notify the shipping department in advance for transport preparation:
 - 8a. After "Mark as Packed", warehouse staff selects the "Advance Notice" function, and the system immediately sends a notification to the shipping department.
 - 8b. The system records this operation normally and returns to the main process.

2. Draw a sequence diagram for the 'Place Order', and 'Cancel Order' use cases. (10 marks)

Place Order:

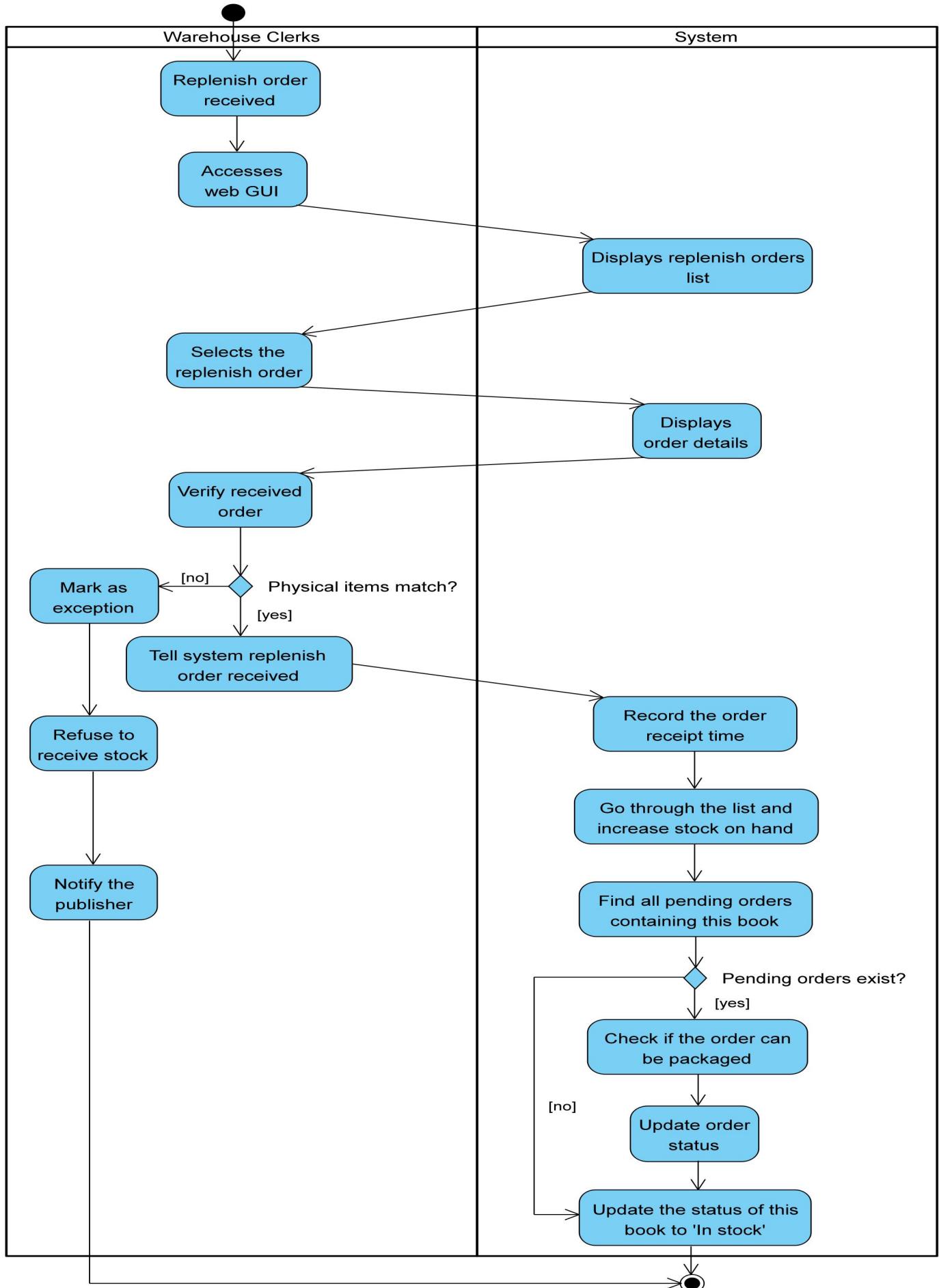


Cancel Order:

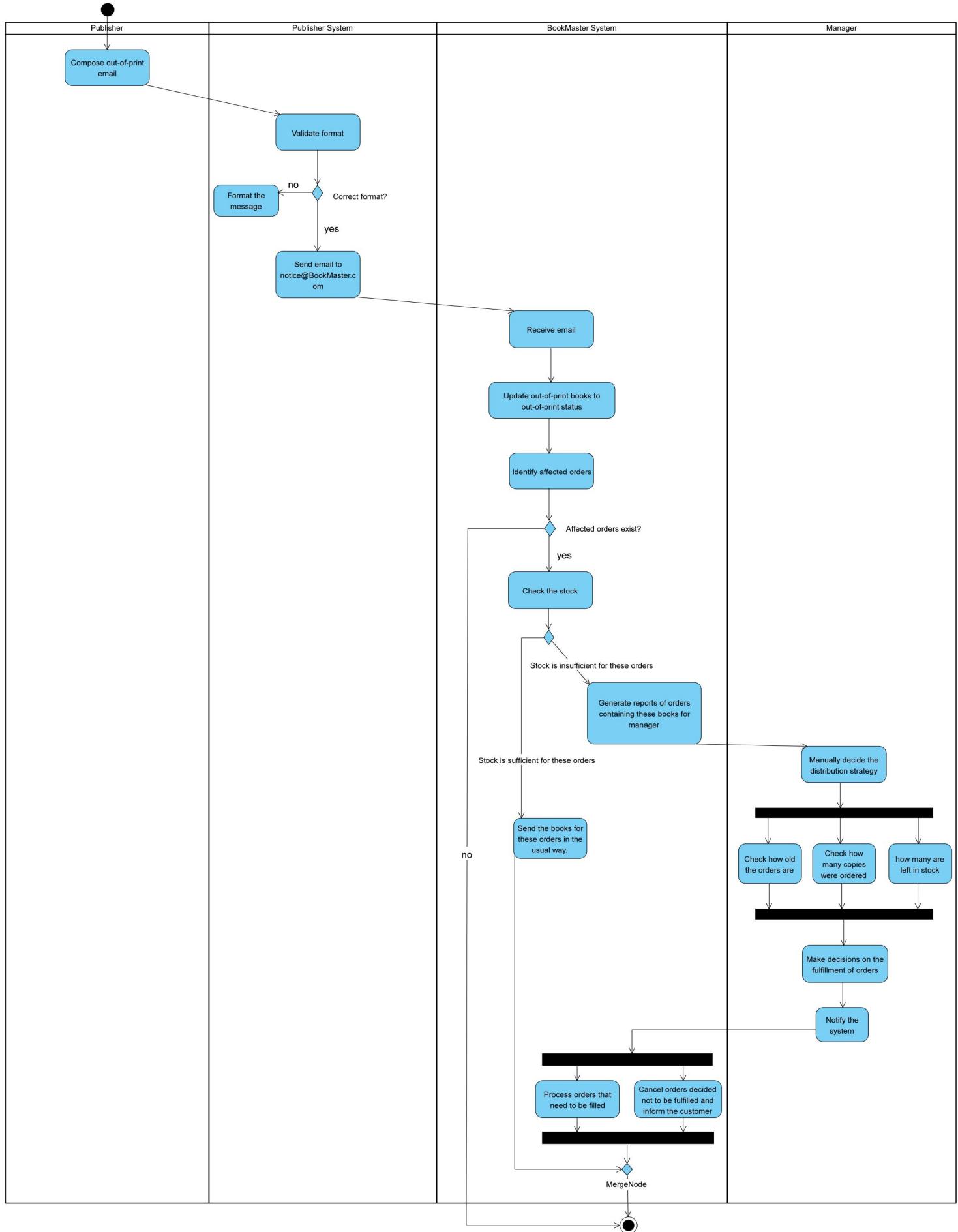


3. Draw an activity diagram for the 'Stock Receiving' and 'Manage Out-of-Print' use case. (10 marks)

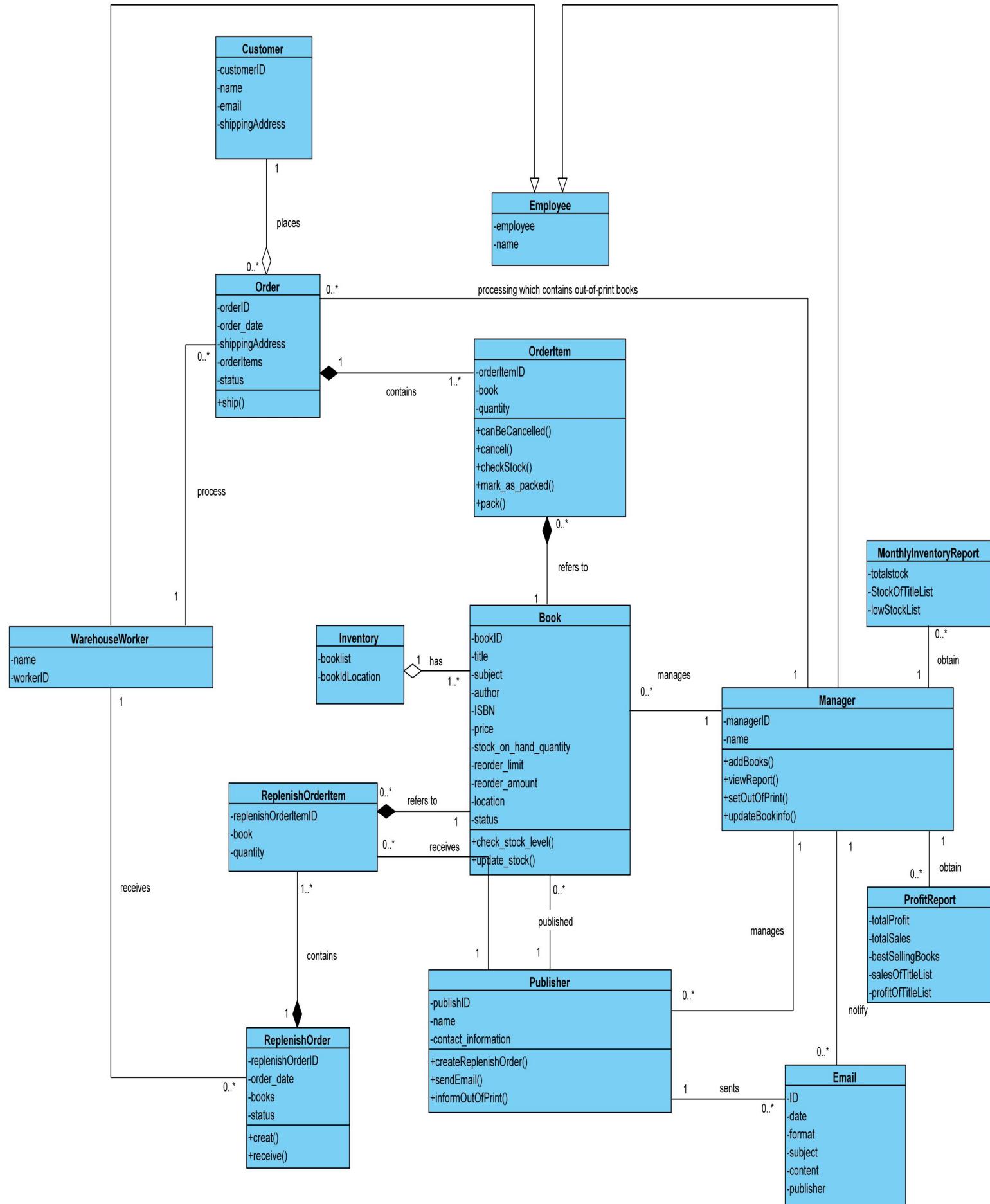
Stock Receiving:



Manage Out-of-Print:



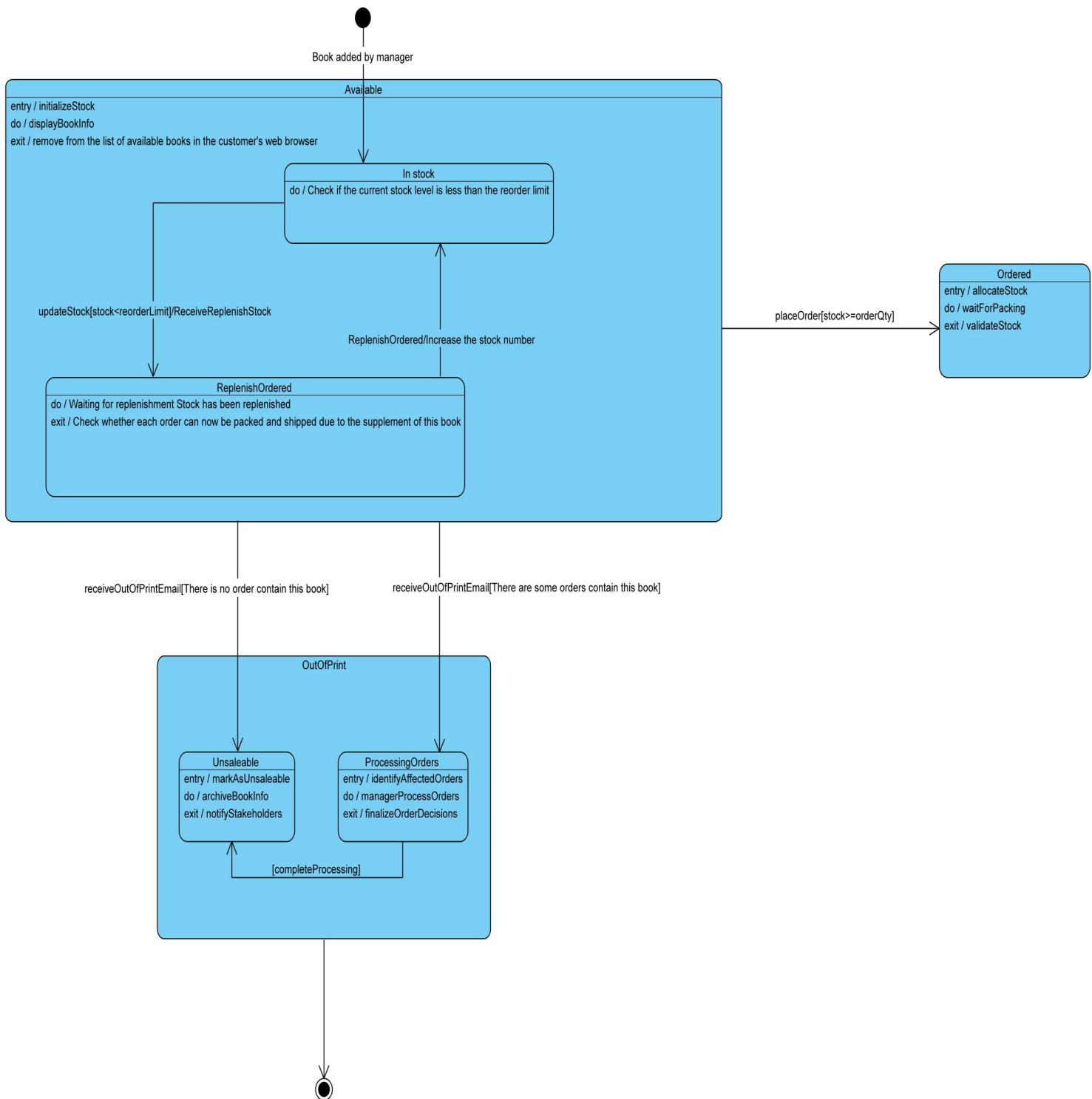
4. Draw a class diagram for the system. (10 marks)



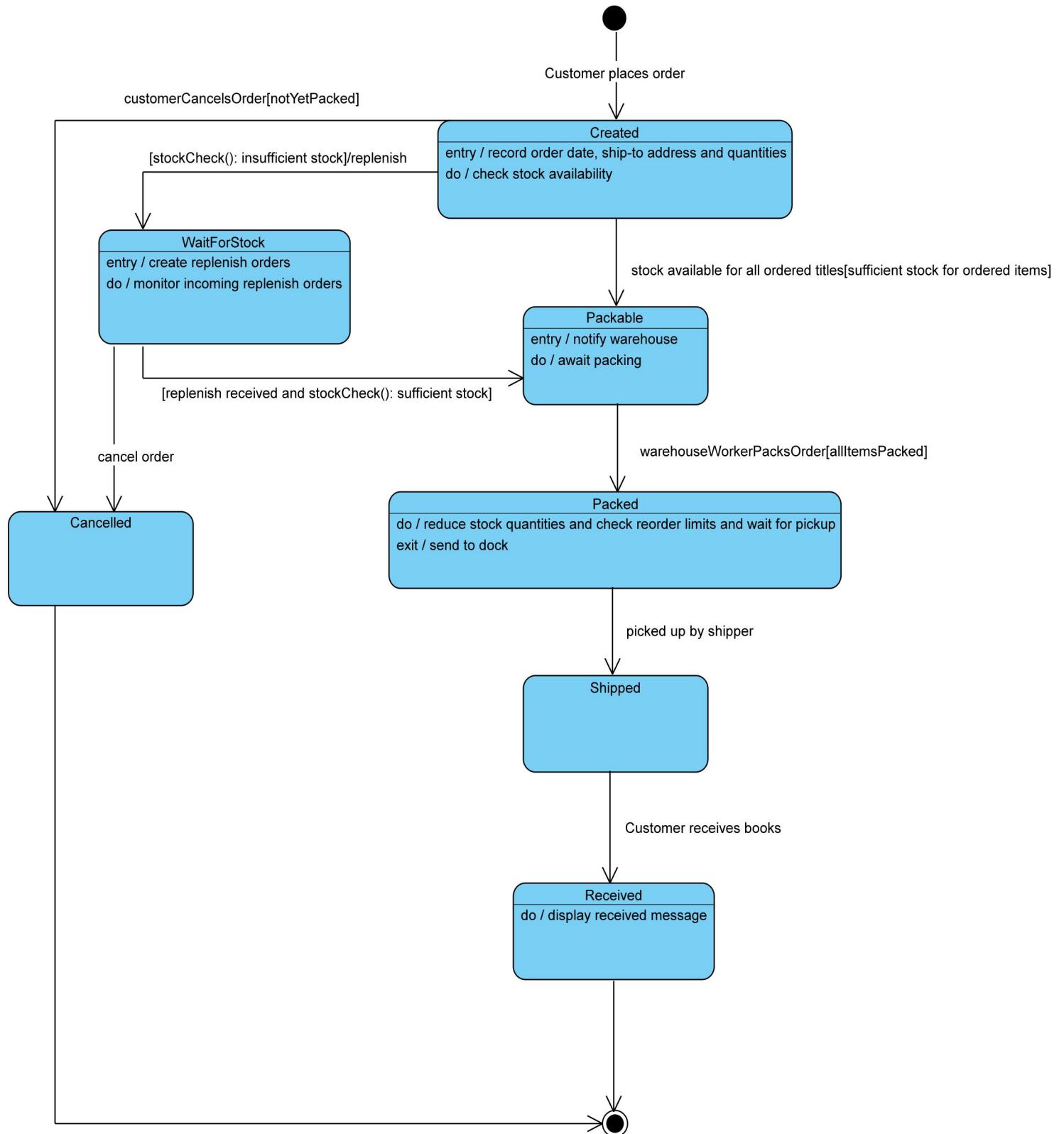
5. From the class diagram, identify the classes with potentially complex states. Draw state machine diagrams for these classes. (10 marks)

Classes: Book, Order

Book:



Order:



1. Which software process is most suitable for the project described in the case? Justify your answer.

The BookMaster project is best suited for Agile development methodology for several reasons:

- (1). Iterative development with the incorporation of flexibility into the model. The specification document mentions that the proposed system is a prototype version that only aims to exemplify the main concept. This implies a need for a development process that merges together the cycles of iterative improvement and changing to the feedback and new requirements. Agile supports short development cycles or "sprints" that have a longer-term focus on assessing the system and making changes or adding improvements.
- (2). Agile emphasizes continuous delivery, that is, working versions of the system features are put into operation at the end of each iteration. This makes it possible to release even the tiniest of functional modules very early, and hence the end-users are able to test with immediate effect and leave feedback—important for the BookMaster system. Through the Agile method, core functions of the product like order processing and inventory management are continuously delivered, which helps the team quickly find out what is wrong to make adjustments.
- (3). Human-Centric Approach: The system silences the diverse users (customers, warehouse staff, managers) having different needs. The underlying principle of the method in question is user feedback integration, which guarantees a user-friendly design meeting people's requirements.
- (4). Shift in the necessity: Aside from this, additional functionalities (e.g., payments) may be compelled to be included further, which Agile method proposes to accommodate this seamlessly.
- (5). Expansion Plans and the Many Stages of Growth: Agile design allows huge development of system modules by several teams, and thus, numerous teams working together are able to do their jobs without meeting many dependencies.
- (6). Risk Management: The phased approach of Agile allows to shift risks to the early phase and improves the reaction time to the market needs.
- (7). Feedback Incorporation: Integrating real-time user feedback into the workflows is one of the cornerstone principles of Agile and very helpful in refining the system during the developmental stage. Also, to pack it up, after every iteration, Agile development also takes the humble initiative to gather user feedback to address any useless stuff quickly.
- (8). Agile vs. Waterfall and Reuse-oriented: Agile is more flexible than Waterfall, accommodating changing needs and iterative testing. It is also faster and easier to apply than the Reuse-oriented approach, enabling swift market responsiveness.

2. Identify and analyze ethical concerns for the case study and make reasoned ethical choices.

(1). Data Privacy and Security:

Customers inputting personal data require assurance of its security. BookMaster must guarantee the confidentiality, integrity, and availability of collected personal information.

Ethical Choice: Deploy robust encryption for data storage and transfer, comply with global data protection regulations like GDPR, routinely assess security controls to avoid breaches, and present a transparent privacy policy explaining data handling practices.

(2). Accessibility and Inclusivity:

To ensure accessibility and inclusivity, it's essential that the software's interfaces for customers, warehouse staff, and managers be accessible to individuals with disabilities. Ethical Choice: Design GUIs to meet accessibility standards like the Web Content Accessibility Guidelines (WCAG). Include features such as screen reader compatibility, adequate color contrast, and keyboard-navigable interfaces.

(3). Fairness and Transparency:

BookMaster's lack of transparency and accountability in data processing and decision-making can lead to user distrust and perceived unfairness. Ethical Choice: Clearly communicate system operations, decision-making processes, and establish accountability through external audits. Foster transparency to demonstrate commitment to fairness, build trust, and ensure adherence to ethical standards.

(4). Intellectual Property and Ownership:

If the intellectual property used in the system is unauthorized or unlicensed, it may lead to legal and financial

risks. Ethical Choice: Develop clear intellectual property policies, use licensing agreements to obtain the right to use third-party IP, and educate employees to comply with intellectual property regulations to avoid infringement.

(5) Continuous Improvement and Monitoring:

Failing to regularly monitor system inclusivity may cause EDI goals to be unmet. Ethical Choice: Periodically assess accessibility, user satisfaction, and diversity metrics to optimize inclusivity. Leverage user feedback to iteratively improve and consistently meet needs.

(6) Sustainability Practices:

The physical operations of packing and shipping books have environmental impacts, raising ethical concerns about sustainability. Ethical Choice: Use environmentally friendly packaging materials and efficient logistics to minimize the carbon footprint. Additionally, implement a program to reduce waste and promote recycling within operational processes.

3. What are the non-functional requirements that might impact the system, and how might they do so?

(1). Usability:

Separate forms for different classes of users (stylish for customers, straightforward for stockroom, operable for managers). For instance, users must be able to accomplish their primary objective, for example, completing, amending, or canceling an order, without bothering to read the manual beforehand.

Impact: Although there are no specific repercussions provided, probably users will experience more dissatisfaction, lower performance rates, and increased customer service and error costs.

(2). Performance:

It should meet the delay of less than 2 seconds during the loading of web page or web operation and allow 1000 users concurrently without affecting performance.

Impact: It can affect user satisfaction negatively, causing a higher rate of cart abandonment, system crashes at peak times, and more complaints from clients; in turn, this will impact the organization in building its reputation and attaining competitive advantage.

(3). Security:

Requirement: Implement role-based access control, including logging and weekly reviews; Unauthorized access needs to be denied; Encrypt stored sensitive data using a strong encryption algorithm such as AES-256.

Impact: Failure to implement security measures can result in data breaches, legal action, regulatory penalties and a loss of customer trust.

(4). Reliability:

Requirement: Real-time order and inventory updates with 99.99% accuracy; 99.9% system uptime (max 8.76 hours downtime annually).

Impact: Failing reliability standards risks order errors, inventory issues, downtime, and data inconsistencies, affecting customer satisfaction and operations.

(5). Integration (Scalability):

Requirement: Automatically parse email notifications from at least 10 major publishers; Generate report formats that are fully compatible with existing systems (e.g. PDF, Excel, CSV).

Impact: Unfulfilled integration requirements can lead to increased operations, limited traceability, and silos of data, affecting efficiency and quality of service.

4. What challenges might arise when working in collaboration, and what do you propose to overcome these challenges?

1. Task Assignment Ambiguities

Challenge: Initial unclear task assignments resulted in duplicated or overlooked work.

Solution: We implemented Scrum, decomposing tasks into manageable subtasks at each stage's beginning. Organizing the project into sprint iterations allowed members to voluntarily take on tasks matching their skills and needs, ensuring clear Scrum role division.

2. Communication Issues

Challenge: Ineffective communication led to misunderstandings and reduced efficiency.

Solution: We adopted the Daily Stand-up method from Scrum, holding brief daily team meetings for quick information sharing and feedback. Additionally, we utilized WeChat to streamline daily collaboration. In the absence of team members, we prioritize video conferencing to minimize misunderstandings.

3. Conflicts and Disagreements

Challenge: Conflicts and friction may arise during team collaboration and product development.

Solution: We resolved issues through cooperation and compromise. Open communication, active listening, and focusing on shared interests helped prioritize problem-solving over personal differences. Clear goals and rules guided discussions, with individual conversations handling emotionally charged situations before seeking consensus. Scrum sprint reviews managed conflicting outputs to maintain consistency and compatibility.

4. Emotional Management

Challenge: Team members may experience stress and burnout during intensive collaboration periods.

Solution: We implemented regular wellness check-ins, created a supportive environment for expressing concerns, and established flexible working hours when needed to maintain emotional well-being.

5. Time Management and Accountability

Challenge: Coordinating schedules and ensuring task ownership were difficult.

Solution: We employed project management tools to establish clear timelines and defined roles and responsibilities. Regular accountability check-ins ensured that everyone remained on track, contributing to the project's success.

5. What measures can BookMaster take to ensure that the warehouse interface is user-friendly for employees of all backgrounds, including those with different levels of technical proficiency?

(1). Accessible Design and Simplified Navigation(EDI Document, Section 2.1,4.1):

Create a clean, straightforward layout with clearly labeled buttons and menus; Organize information logically to minimize clicks and limit options on each screen to avoid overwhelming users; Implement a clean layout with high contrast and large fonts; Integrate keyboard shortcuts for common functions, allowing users to perform actions quickly without relying solely on a mouse.

Robustness: The system should be compatible with various browsers and assistive technologies to ensure reliable use by employees with different devices or needs.

(2). Inclusive Development Teams and User-Centered Design(EDI Document, Section 3):

Diverse Teams should include members with varied backgrounds and experiences; Involve warehouse staff in the development process to gain practical insights and ensure that the interface is user-friendly for a wider range of employees; Conduct user testing with employees of varying skill levels to gather feedback and make necessary adjustments.

(3). Mitigating Bias in Interface Design:

To prevent bias that may be detrimental to certain groups of employees, Bookmasters should follow guidance on understanding and mitigating bias (Section 3.3 of the EDI document).

Diverse user testing: Involve different employees during the testing phase, including those with low technical proficiency and non-English speakers, to identify and address potential usability issues.

(4). Guided Support and Training(EDI Document, Section 4.3):

To ensure the effective utilization of different employees, BookMaster should provide training and awareness programs; Provide on-screen tutorials, tooltips, and a comprehensive help section with FAQs; Offer training sessions for all employees, along with a dedicated support contact for immediate assistance; Develop sessions for different skill levels.

(5). Creating an Inclusive Workplace Culture

An inclusive workplace culture can enhance the effectiveness of warehouse interfaces (EDI Document Section 3.1) by prioritizing cultural sensitivity, establishing feedback mechanisms, ensuring accessibility, employing inclusive design principles, providing diversity training, adopting a data-driven approach, and fostering continuous improvement. These strategies help create an environment where employees from diverse backgrounds feel valued, respected, and empowered to contribute their unique perspectives and experiences, ultimately leading to a more effective and user-friendly interface that meets the needs of an evolving workforce.

Section 5. Peer review form template

CPT203 Coursework

Peer review

Individual Contribution for Group Report

Group Number: <X>

Name	ID Number	Contribution (%) Please enter an integer, for example 15% contribution, please enter 15. The sum of this column should be 100	Signature
1. Yize liu	2254472	20	Yize Liu
2. Shengtian Huang	2254461	20	Shengtian Huang
3. Qing qin	2254084	20	Qing qin
4. Xu Chen	2257453	20	Xu Chen
5. Zichen Qiu	2252705	20	Zichen Qiu

END