

# Automate the trading activities of a bookstore as a business process improvement factor

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**Abstract.** This article presents a project of a bookstore information system, the main purpose of which is to automate the trading activities of a bookstore, work with reports on sales and purchases. The purpose of creating the system is: to increase the number of clients served per unit of time due to the automatic generation of checks and invoices; reducing the time for processing and processing orders, searching for the necessary information about the product and generating invoices by storing and systematizing data in electronic form; reduction of costs and time for registration of deliveries of goods due to partial auto-completion of documents.

## 1 Introduction

In the modern world there is a lot of competition between different areas in the field of trade. This has not bypassed bookstores. Someone might say that in the age of information technology, paper books have lost their position in the trading market. However, this statement will not be true. Since some books cannot be downloaded from Internet resources for free, someone still prefers the paper format of the book, and paper books have not been canceled in schools. It follows from this that paper books are still popular [1-3].

Also, the relevance of this topic is due to the lack of analogues with low cost and the necessary functionality on the market and the need to automate the trading activities of the bookstore in order to simplify the control of purchases and sales, and record keeping.

The bookstore specializes in the purchase and retail resale of books. The purchase occurs from various suppliers at various prices, but the sale is made at a fixed, predetermined price. If the purchased goods do not meet the declared quality or other declared criteria, then such goods are returned to the supplier and an appropriate entry is made in the supply log. If the buyer is not satisfied with the purchased goods or there are other reasons for returning the goods to the store, then he has the right to return the goods and receive a refund of the amount of money that he paid upon purchase. All sales, deliveries and returns are recorded in the appropriate records. For all records, reports are subsequently generated, for example, a report on the amount of sales for each type of item. In warehouses, where the goods are stored at regular intervals, an inventory is carried out, the results of which reveal a surplus of goods or their absence, a deviation in quantity and amount. After a deviation is detected, write-off or

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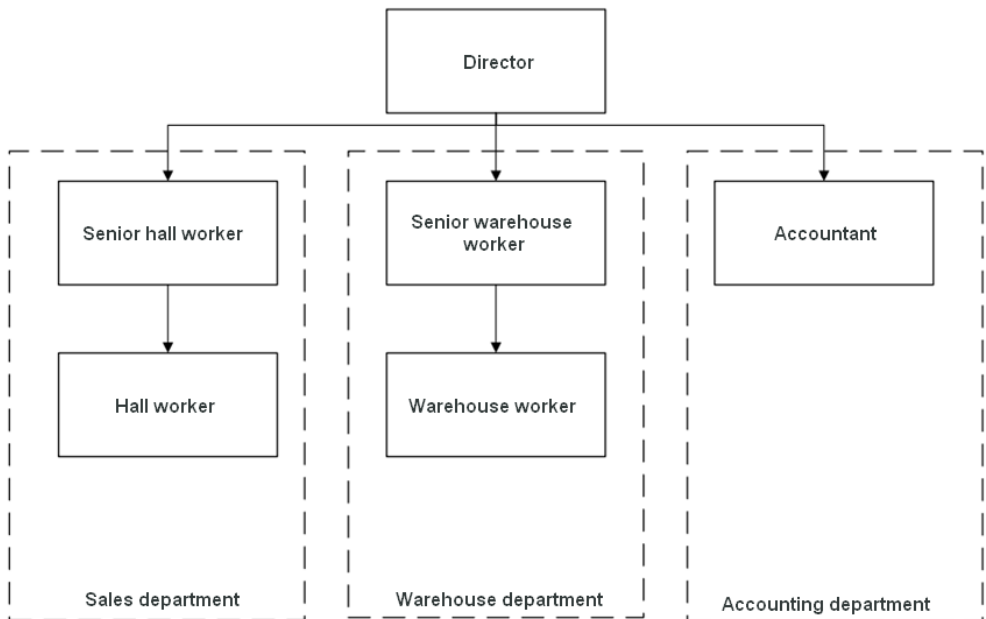
posting is carried out, which allow you to correct information about the goods that are stored in the warehouse [4-5].

To solve the task, you must do the following:

- select the necessary subsystems;
- implement a user interface;
- implement the internal business logic of the application;
- carry out algorithmization of typical information requests.

## 2 Functional and organizational structure

Figure 1 shows a diagram of the organizational structure, which schematically reflects the composition of the enterprise's divisions.



**Fig. 1.** Organization chart.

The sales department includes the main worker of the hall and the worker of the hall. The employee of the hall sells the goods to the buyer. The main worker of the hall performs the same functions as the worker of the hall, but also deals with the registration of the return of goods from the buyer [6, 7].

The warehouse department includes the chief warehouse worker and the warehouse worker. The warehouse worker can take deliveries of goods to the warehouse and take inventory. The chief warehouse worker performs the same functions as the warehouse worker, but is also involved in processing the return of goods to the supplier, writing off and posting goods in the warehouse.

The accounting department includes an accountant who deals with the payroll of employees.

The sale of goods includes:

- sale of goods;
- issuance of paid goods;
- return of goods from the buyer. Purchase of goods includes:
- purchase and placement of goods in the warehouse;

- return of goods to the supplier;
  - inventory;
  - write-off of goods;
  - posting of goods.
- Personnel work includes:
- enrollment of an employee;
  - payroll for employees; Reporting includes:
  - formation of a report on sales of goods by the amount of sales;
  - formation of a report on sales of goods by the number of sales;
  - generation of a report for each type of nomenclature;
  - formation of a report on sales of employees;
  - formation of a report on accrual of employees.
- Administration includes:
- setting information about the organization.

### 3 Description of data flows and business processes

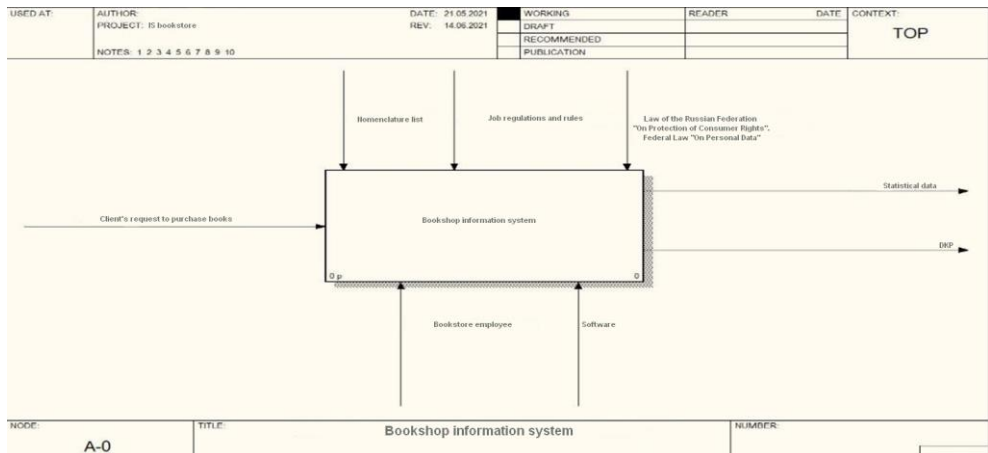
A business process is a combination of interrelated activities and works that are aimed at the implementation of a specific product or service at the request of the consumer. For a graphical description of activities, flowcharts are used [8, 9].

The context diagram "Information system of the bookstore" is shown in Figure 2.

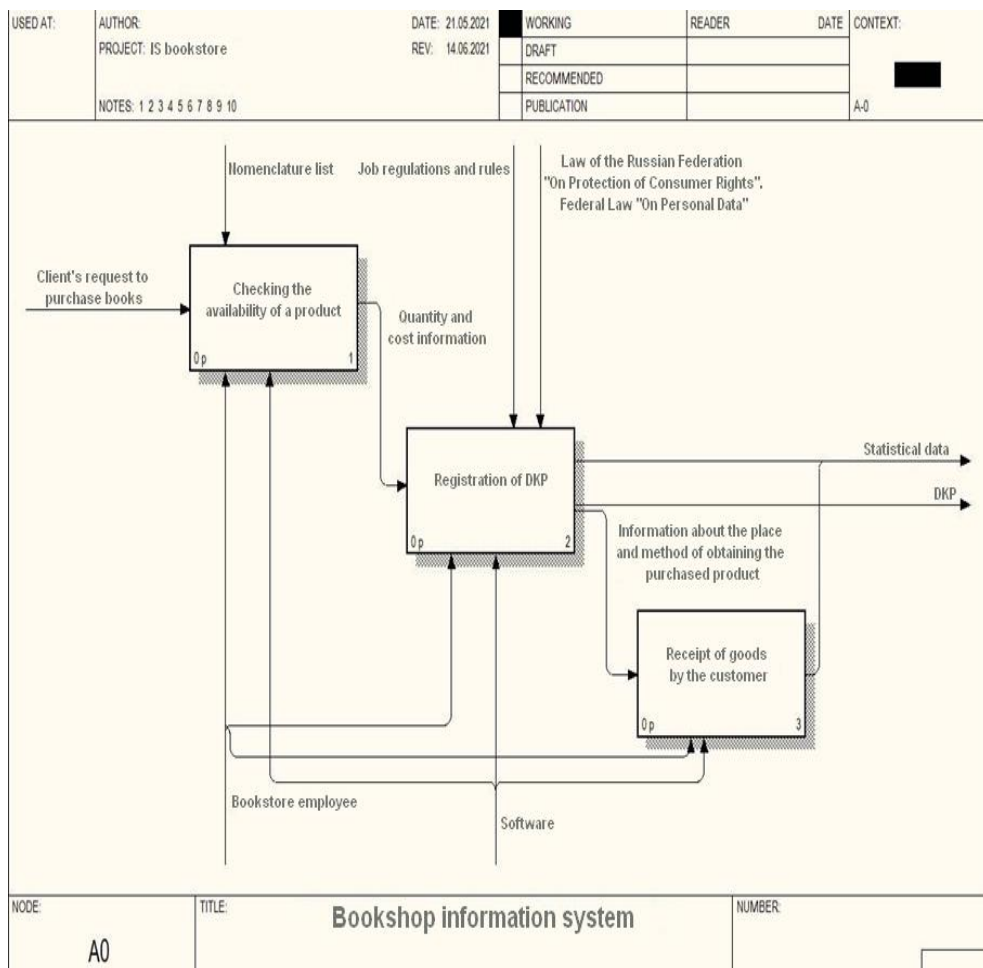
The overall function is then broken down into larger subfunctions. This process is called functional decomposition. The decomposition diagram of the context diagram is shown in Figure 3.

The diagram shown in Figure 3 includes the following activities:

- checking the availability of goods (A0.1);
- registration of PrEP (A0.2);
- receipt of goods by the customer (A0.3).



**Fig. 2.** Context diagram of the main business function.



**Fig. 3.** Decomposition diagram of the main business function.

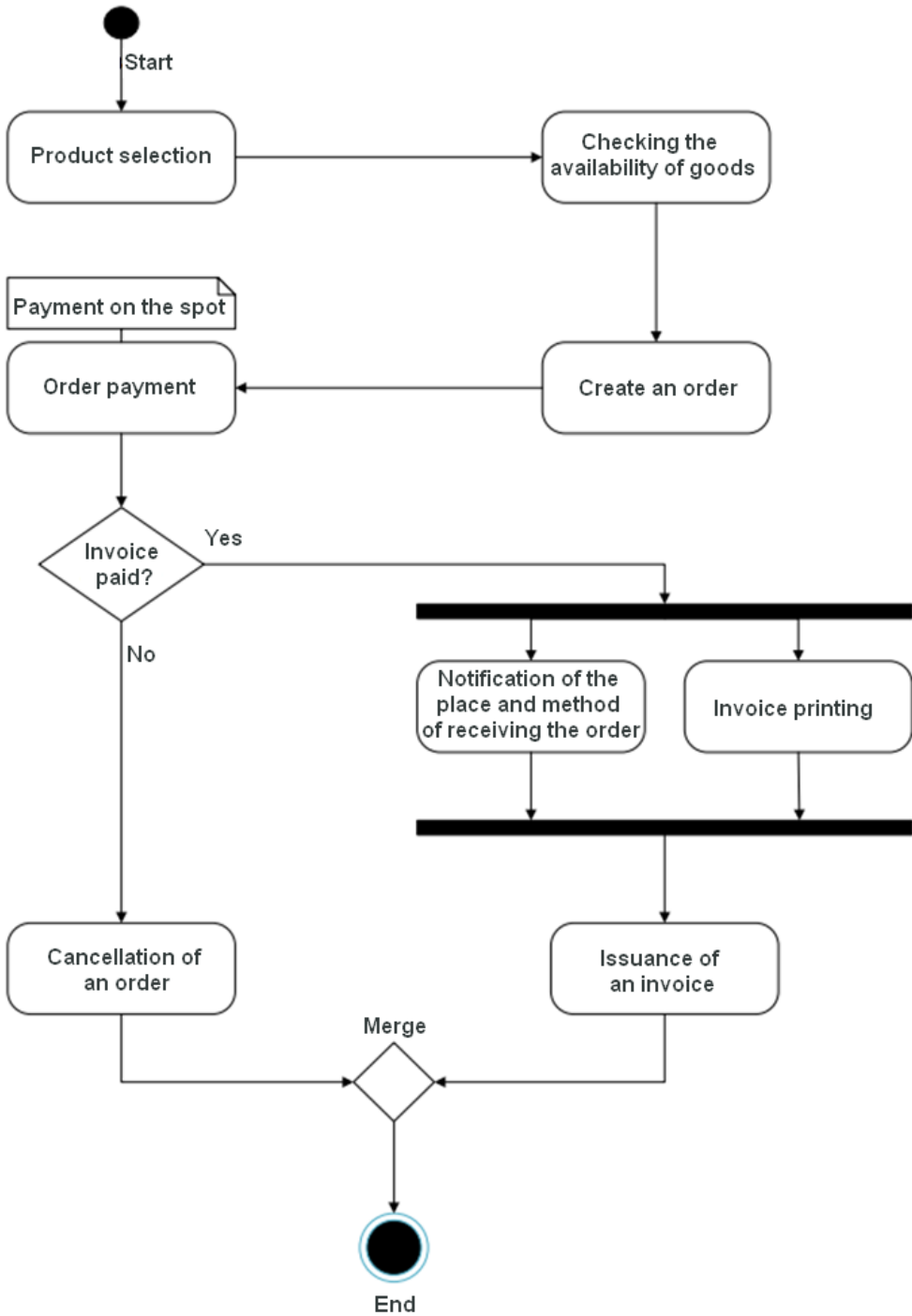
Next, it is necessary to carry out the algorithmization of typical information requests by drawing up diagrams of activities and sequences.

An activity diagram can be thought of as a granularity of use case diagrams. The main element is a certain action (a certain function to be performed), but the distinguishing feature is that it is internal to the system and should not be “closed” to an external subject. The action is drawn as a rectangle shape, and inside the rectangle is a description of the action to be performed. Transitions between actions are represented by a solid line with an arrow. A conditional jump is shown as a diamond. The beginning and end of the algorithm are shown as circles. The activity diagram is shown in Figure 4.

A sequence diagram is a UML diagram that shows the life cycle of a particular object and the interaction of IS actors within a single precedent for a certain set of objects on a single axis.

Sequence diagrams are intended to clarify use case diagrams and describe the logic of use cases. This tool is suitable for documenting a project based on its use case.

A sequence diagram consists of object labels, vertical "lifelines" to show the passage of time, and arrows to show the exchange of messages between certain objects. The sequence diagram is shown in Figure 5.



**Fig. 4.** Activity diagram.

An activity diagram allows you to describe the logic of procedures, business processes and workflows. It resembles flowcharts, but the main difference between this diagram and flowchart notation is that the activity diagram supports parallel processes.

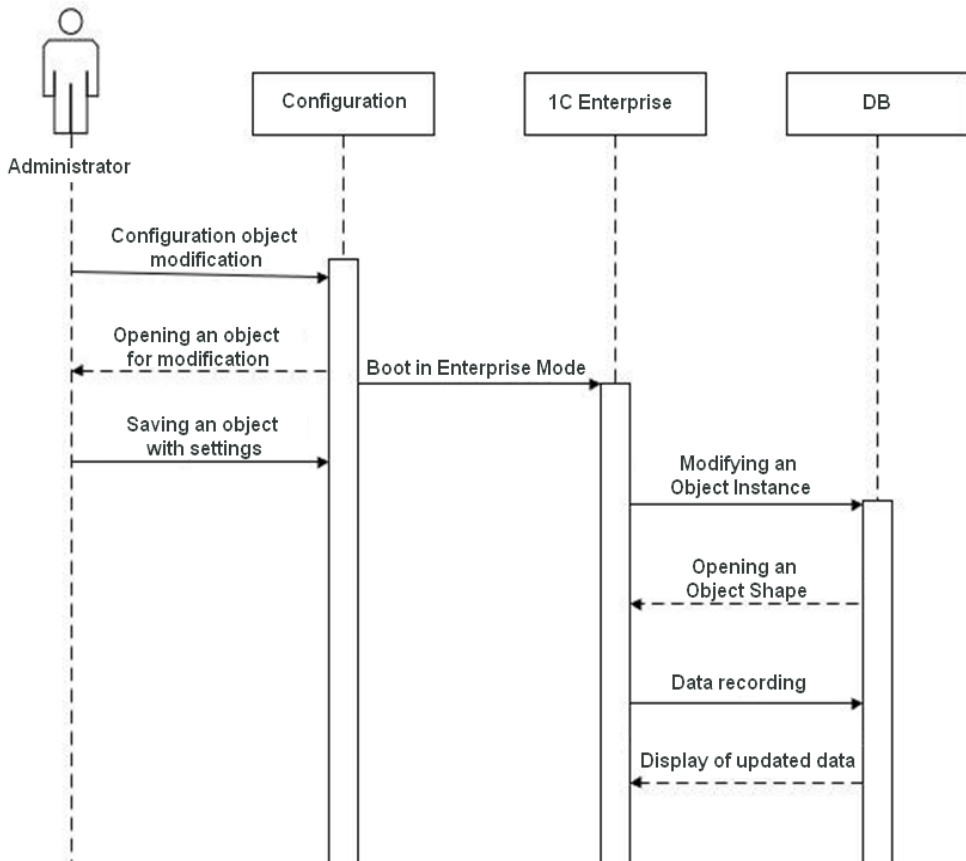


Fig. 5. Sequence diagram.

The constructed activity diagram displays a list and algorithm of actions for performing the main business process "Sales of goods", and the activity diagram describes the main process of employee interaction with the application.

## 4 Conclusion

In the course of the research work, the following results were obtained:

- a pre-project analysis of the subject area was carried out, the input of which was an idea of the main functionality that should be implemented in the system being developed;
- system design was carried out, as a result of which the concept and architecture of the information system being developed was developed and a list of necessary technical support was compiled;
- an information base has been developed for the information system of the bookstore, which will allow organizing the storage and management of all necessary information within the system, as well as diagrams of activities and sequences.

This information system will allow employees of the enterprise to correctly maintain documentation related to the sale and supply of goods, serve customers faster and manage the turnover, which will reduce the time for the formation and maintenance of documentation, increase the number of customers served per unit of time and reduce costs and time for managing the turnover.

## References

1. Q. Xu, D. Zhao, *Research on B2B E-Business System of Bookshop Based on Web Service*, in 2010 2nd International Conference on E-business and Information System Security, 22-23 May 2010, Wuhan, China (2010) <https://doi.org/10.1109/EBISS.2010.5473600>
2. D. Gray, *The formal specification of a small bookshop information system*, IEEE Trans. Soft. Engin. **14**, 2 (1988) <https://doi.org/10.1109/32.4644>
3. Z. Zi-ming, M. Bo, *An intelligent shopping system based on multi-agent collaborative working model*, in Canadian Conference on Electrical and Computer Engineering, 01-04 May 2005, Saskatoon, SK, Canada (2005) <https://doi.org/10.1109/CCECE.2005.1557279>
4. W. Liu and N. Liu, *An intelligent sales-agent interface prototype for B2C online shop*, in 2011 International Conference on Computer Science and Service System, CSSS, 27-29 June 2011, Nanjing (2011) <https://doi.org/10.1109/CSSS.2011.5972222>
5. M. Sakaguchi, A. Sugiura, T. Kamba, *A shopping assistant agent for Web-shops*, in Proceedings 1999 IEEE Workshop on Internet Applications (Cat. No. PR00197), 26-27 July 1999, San Jose, CA, USA (1999) <https://doi.org/10.1109/WIAPP.1999.788014>
6. A. Ogino, T. Miyazaki, T. Kato, *Framework for Modeling User Interest using Augmented Shopping Store*, in s2006 IEEE International Conference on Systems, Man and Cybernetics, 08-11 October 2006, Taipei, Taiwan (2006) <https://doi.org/10.1109/ICSMC.2006.384408>
7. C. Felden, P. Chamoni, *Recommender Systems Based on an Active Data Warehouse with Text Documents*, in 2007 40th Annual Hawaii International Conference on System Sciences, HICSS'07, 03-06 January 2007, Waikoloa, HI, USA (2007) <https://doi.org/10.1109/HICSS.2007.460>
8. S. S. Sohail, J. Siddiqui, R. Ali, *Ordered ranked weighted aggregation based book recommendation technique: A link mining approach*, in 2014 14th International Conference on Hybrid Intelligent Systems, 14-16 December 2014, Kuwait, Kuwait (2014) <https://doi.org/10.1109/HIS.2014.7086167>
9. M. Singh Deora, *A Perception of ICT and Social Media for Online Purchasing Trends*, in 2018 Second World Conference on Smart Trends in Systems, Security and Sustainability, WorldS4, 30-31 October 2018, London, UK (2018) <https://doi.org/10.1109/WorldS4.2018.8611590>