



DESIGN OF AUTOMATED ENTERPRISE INFORMATION SYSTEMS USING UML DIAGRAMS IN THE CREATION OF APPLICATIONS

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Abstract:

The article examines the example of process automation at a carbonated water production company through the development of an information system project. The article presents the following stages of development: analysis of business processes of the subject area, systems design methods, system development requirements, system design in the UML modeling language, conceptual data model design.

Keywords: information system, business process automation, business process analysis, design, information system development, software.

Introduction

Usually, software developers use UML diagrams to create new systems, but today they are not limited to only one possibility.

UML diagrams are widely used in various areas of business. Unified Modeling Language (UML) is a standardized modeling language. It helps software developers visualize, build, and document new software systems and projects. It is used to provide a standardized way of visualizing the architecture, design, and implementation of complex software systems. It is a rich language for modeling software solutions, application structures, system behavior, and business processes. There are 14 UML diagram types that help model these behaviors. UML is not only used by software developers, but is a more widely used approach for modeling and modeling applications, as well as software documentation.

Maintaining hierarchies and relationships within a system can be difficult for software developers - especially when focusing on complex and detailed areas of code.

But using the UML model divides these systems into components and subcomponents. This makes it easier to imagine, plan and implement their project. For business analysts, UML diagrams help visualize the system or process they are working on.

Technical characteristics of the project

You do not need to save on the room and its equipment in order for the water to be of high quality in terms of taste and composition. Usually, production is located near a well, tap or other source of raw materials. Some manufacturers choose a separate



method for cleaning and bottling raw water. The equipment must have a modern multi-stage filtration system to eliminate the risk of receiving an incompletely purified product. This will help the water to spoil quickly and create an unpleasant smell. It is best to choose a fully automatic cycle, from filling raw materials to containers.

The price of the equipment depends on the configuration and manufacturer. There are many offers on the market. It is necessary to consider what is the purpose of a small water production business - small batches of non-carbonated drinking water or a multidisciplinary workshop (carbonated water, mineral, sweet, medicinal). But there is no need to save on the equipment of the production line. Do not forget about the consumables (filters and other devices) that need to be changed in time so that the water quality does not decrease.

Equipment for the preparation and packaging of carbonated drinking water

The line can be conventionally divided into several sections: water, syrup, preparation of containers, packaging, sealing, labeling and packaging.

Line pump 1, mixing tank 2, rinsing machine 3, compressor blowing machine 4, mechanical filter 6, carbon filter 7, ultraviolet sterilizer 8, cooling water machine 9, saturator 10, filling machine 11, capping machine 12, labeling 13, group packaging in shrink film 14 and carts 15.

All the necessary components (sugar syrup, color, prepared water) are placed in the mixing bowl 2 according to the recipes of the prepared drinks. The preforms enter the blowing machine 4, in which PET bottles are obtained due to heating with IR lamps and blowing with compressed air produced by the compressor 5. They are sent to machine 3 for washing, then they enter the packaging area, and then the operations are repeated in a similar way to the operations on the Aqua line for the preparation and packaging of still drinking water.

The most convenient and frequently used UML diagrams that we will cover in this article are UseCase, Class, and Activity.

About the main role of diagrams used in a carbonated beverage plant and liquefaction

Workers in the factory: Chief employee, 2 workers, delivery person, accountant.

About factory buildings: Raw material warehouse, water reservoir, main work process building.

Necessary equipment: 1. Plastic container, blowing equipment, tunnel and compressor equipment, water filtering equipment, gasification equipment, equipment for bottling carbonated water and screwing the lid, labeling equipment, blocking equipment are needed.

Use case (Behavior) A use case diagram shows the interactions between users - also called "actors" and represented as sticks - and the system itself.

It describes the functionality of the system by focusing on the expected behavior of the system, showing what happens and when. In this project, the main activities of the workers of the enterprise and their mutual relations are formed. It is important

to logically express the interrelationship of the participants and activities involved in the competition according to the UML notation. What is the main issue? The enterprise produces the product for the customer. Here, the main requirement for us is that we serve the customer for the customer, so the process from the customer's order to receiving the product should be covered.

| Actor | Short Description |
|---------------------------------|--|
| Buyurtmachi (customer) | Placing an order and receiving an order |
| Ish boshqaruvchi (Work manager) | Order acceptance, control of reports and workers nazorat qilishi. |
| Ishchi 1 (Worker 1) | Suv omborini nazorati va suvni asosiy binoga etkazishni taminlash |
| Ishchi 2 (Worker 2) | Control the supply of raw materials and ensure their delivery to the |

Use cases of the system

At the stage of analyzing business processes, the main candidates for the participants of the information system were identified and their brief description is presented in Table 1.

Table 1. Subjects of the information system

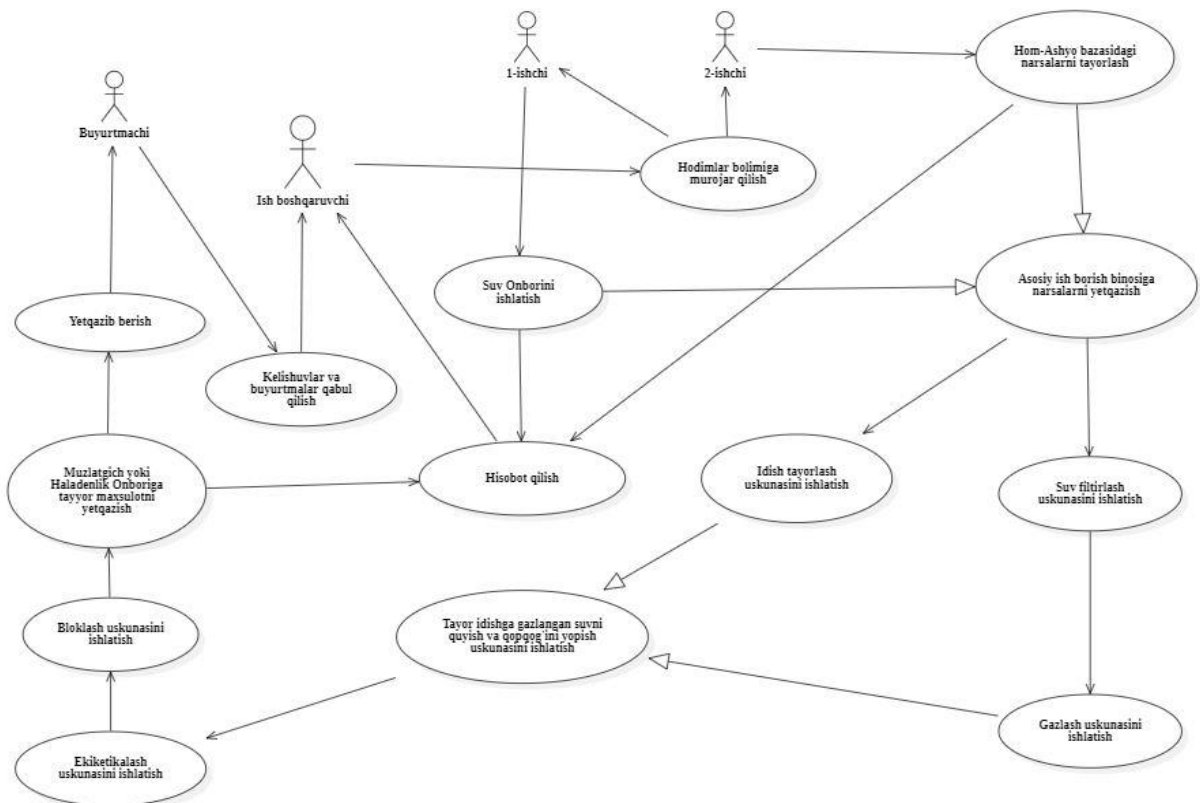


Figure 1: Carbonated Beverage Plant project in Use Case diagram



Formation of requirements for the information system

As a result of studying the topic and analyzing the company's business processes, the following requirements were set for the information system in production:

- T1 – the system must ensure acceptance of orders;
- T2 – the work manager for the system order should be able to create information about the product, receive orders;
- T3 – the system should create customer data, generate order reports;
- T4 – the system must take into account the quality of the manufactured products;
- T5 - the system must ensure the accuracy and continuity of the order of production processes;
- T5 – the system should control the quality of the packaging process of manufactured products;
- T7 – the system should control the delivery of products to customers.

In the diagram, the class is represented by a rectangle. Each rectangle is divided vertically into three parts. At the top is the name of the class. The second and third sections detail the operations, behaviors, and attributes of the class.

Because software is typically based on object-oriented programming, the class diagram is probably the most widely used UML diagram.

A **class diagram** allows you to map system structures that represent the relationships between various classes, attributes, operations, and objects. Software engineers and business managers alike use this interaction diagram to model the various connections in a process. Class diagrams show the complete process in the manufacturing plant from the moment the customer places an order to the moment the order is received, with the classes' functionality, attributes, and parameter types.

Table 2. Properties of class diagram

| № | Class properties | Order acceptance | Personnel department | ... |
|---|------------------|---|---|-----|
| 1 | Attribute | +Buyutma qabul qilindi: srting +Hodimlar bilan ishlash: string | +Suvni qabul qilish: float +Suvni yuborish: float +Hom-ashyoni qabul qilish: string +Hom-ashyoni yuborish: string | ... |
| 2 | Attribute 2 | - | - | ... |
| 3 | ... | ... | ... | ... |
| 1 | Parameter | +Buyurtma qabul qilindi() +Hodimlar bo'limiga xabar beriladi() | +Suvni taqsimlash() +Suvni nazorat qilish () +Suvni taminlash() +Hom-ashyoni yetkazish() +Hom-ashoni nazorat qilish() +Hom-ashyoni yetqazish() | ... |
| 2 | Parameter 2 | +Shartnoma imzolandi() | - | ... |
| 3 | ... | ... | ... | ... |

This, in turn, creates an opportunity to generate the diagram in a situation that is convenient for the programmer. The purpose of a class diagram can be summarized as follows.

- Analysis and design of the static view of the application.
- Describe the responsibilities of the system.
- Basis for components and placement schemes.
- Forward and reverse engineering.

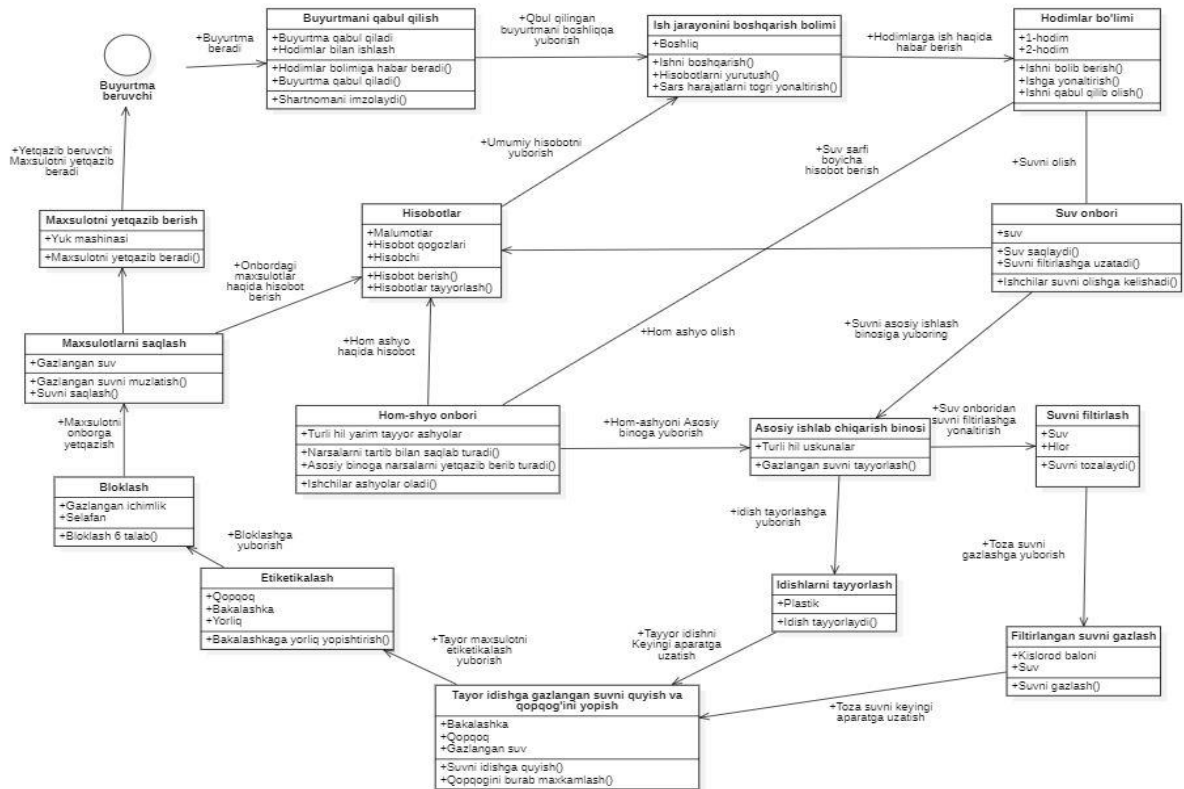


Figure 2: Carbonated Beverage Plant Project in Class Diagram.

Class diagrams only represent process activity and functionality within it. Each diagram has a style and we must pay strict attention to this when using them, otherwise the project's effectiveness will be lost. Each part of the enterprise's production activity is represented by an attribute, parameter. For example, it is possible to explain according to the procedure given in table 2.

The clear assignment of attribute types and the distribution of class parameters will greatly help to make program generation more accurate and easier.

Activity diagrams are flow charts that describe all the activities performed by the system. It shows everything from start to finish, identifying the different decision paths and the steps that need to happen to move from one activity to another. The stages can be chronological, branched or simultaneous. This diagram is usually used to manage the internal structure of business processes. It allows business analysts to effectively plan and manage different workflows in one place.

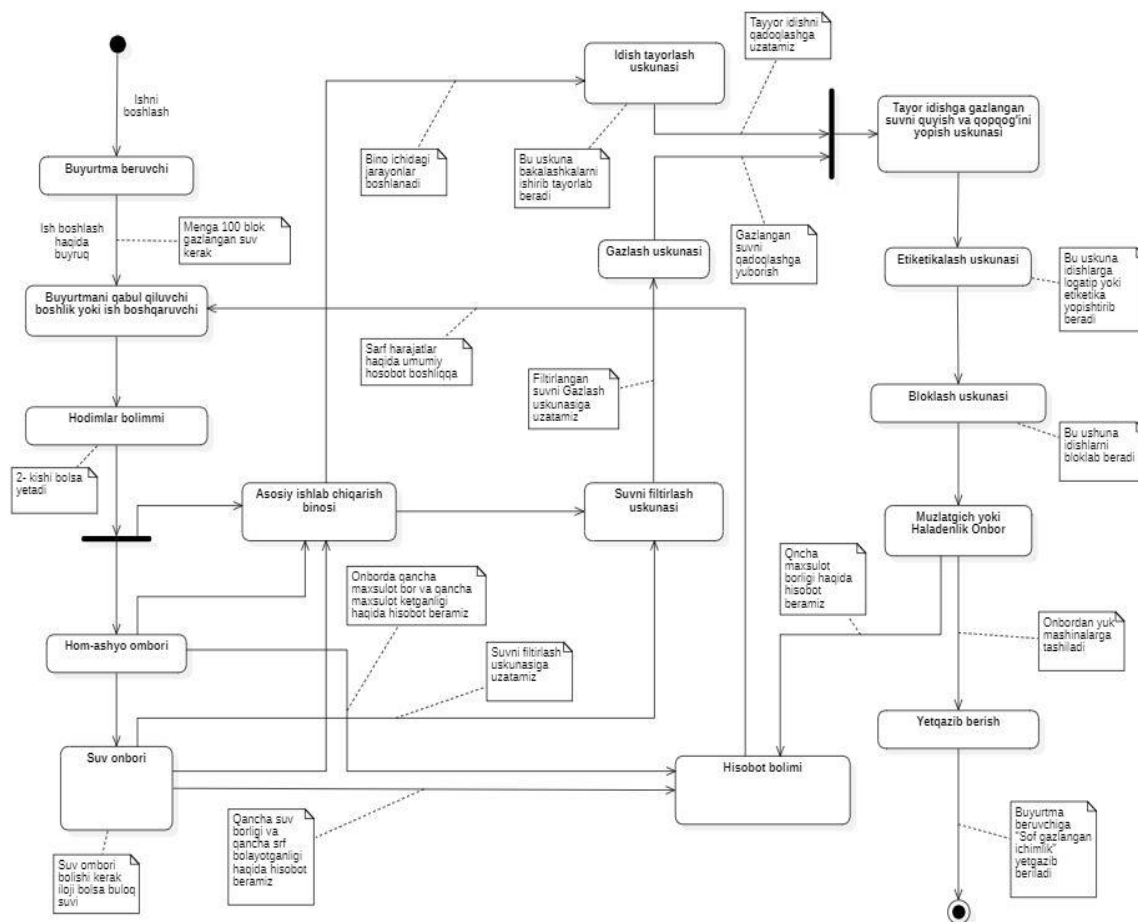


Figure 3: Carbonated beverage plant project in activity diagram

An activity diagram is suitable for modeling the activity flow of a system. An application can have more than one system. An activity diagram also covers these systems and describes the transition from one system to another. This special usage is not available in other charts. These systems can be databases, external queues, or any other system.

There are many such convenient programming standard languages for describing a project. Diagrams used in other projects may differ from each other in terms of shape and notation, but their design features are similar. The UML design language we used differs from other design standard diagrams in that it is very convenient and has special diagram types for each situation.

Summary

The article is based on the development of methods and methods of designing new information systems at the university level in order to improve the quality of production in the Republic, to organize programming technologies in a processual manner based on accurate accounting books. Based on the requirements of today's global market, standards have been developed for the creation of various projects and their quality control, and the development of information systems design is one of the most important issues in order to fully respond to them. Therefore, in my article, I covered the methods of system optimization on the example of an



automated production system suitable for today's requirements. The system project was developed using the UML design language, which is recognized by international standards organizations, and its most used diagrams are used.

The carbonated water production system that I have presented is a schematic description of various processes from beginning to end, i.e., the process of automated production from product resources to the product's completion based on production equipment and tools. Your support of the article will make me publish more articles like this.

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