Information system for managing the register of serialized items based on a cloud service for enterprise economic development

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Abstract. This article describes the development of an information system for managing the register of serialized items based on a cloud service. Cloud services provide the ability to access computer equipment, hardware resources, disk memory and databases via the Internet in a remote format. The developed information system belongs to the type of information retrieval system. Examples of cloud services include: renting a virtual server; virtual contact center; application rental; data store; private cloud.

1 Introduction

In this article, numbered products mean honey. The importance of the work is determined by the increase in the falsification of bee honey, as well as the need to maintain statistics on honey production, since, since 2006, the disappearance of bees has occurred on an unprecedented scale. In Russia, in 2016, in some regions, all bees died among beekeepers, although usually after wintering, mortality in apiaries is less than 10%. In addition to honey production, bees are the main pollinators of the plant, as a result, the extinction of bees will affect all pollinated plants and herbivores.

A unique product number is a digital code assigned to a product at the manufacturing stage and used to identify it throughout the entire life cycle of the product. Product - a manufactured product (honey), each instance of which (for example, a jar of honey) is assigned a unique number. Unique product instance number - a digital code of the unique product number assigned to the product at the production stage.

Consider the algorithm for generating a unique number. The number consists of 9 digits, where: 3 digits – manufacturer's number; 6 digits - product number.

Each manufacturer is assigned a unique user number. Thus, it is possible to determine the goods of one manufacturer, knowing only this number. To solve this problem, it is necessary to develop an information model for accounting for serialized items and justify the operation principle of the information system for managing the register of serialized items based on a cloud service [1-5].
2 Information model for accounting for serialized items

To build a functional model of an information system, it is necessary to build an IDEF0 diagram.

IDEF0 - functional design methodology used to describe business processes. This methodology describes the logical relationships between processes, not their temporal sequence.

“Information technologies for product life cycle support. Methodology of functional modeling”. Basic rules for constructing IDEF0 diagrams: the entry arrow always comes only to the left edge of the activity, the control arrow - only to the top, the mechanism arrow - to the bottom, and the exit arrow - always only to the right.

Figure 1 shows the main function of the information system. It can be seen from the diagram that the input data is the item number, because it is the main item identifier. As a result of the check, at the output of the information system, we receive complete information about the product and the manufacturer of this product. Thus, the accuracy of the information provided can be verified. The rules for working with the information system and the law on the processing of personal data act as control data, and the participants of the information system act as producers [6, 7].

![IDEF0-diagram](image)

**Fig. 1.** IDEF0-diagram.

During the decomposition of the above function, the following works were identified:

- adding numbers;
- adding product information;
- adding product instances;
- obtaining information about the product and manufacturer.

The decomposition diagram is shown in Figure 2.
The diagram shows that in order to obtain information about the finished product, the user only needs to know the number under which this product was released. However, it should be noted that the unique product number and the item number are different entities, since all collected honey is supplied in small jars, each of which has its own unique product number.

To create a unique product number, you must first reserve the numbers in the information system, then, using the manufacturer’s tools, add information about the product (type of honey, collection date, etc.), and then match the reserved numbers with the added product. Thus, a unique product number will be obtained [8-10].

### 3 Principles of operation of the information system

The purpose of design is to ensure the effective functioning of the information system, as well as the interaction of users and developers of the information system. In the design process, both the organization of the main activity of the enterprise and the organization of management procedures are improved.

The architecture of a system is the fundamental organization of a system, embodied in its elements, their relationships with each other and with the environment, as well as the principles that guide its design and evolution. The information system architecture includes:

- the choice of structural elements that make up the system and their behavior within the framework of cooperation of structural elements;
- connection of structural elements into larger systems;
- an architectural style that guides all elements, their interfaces, their collaboration and their connection.
Architectural Approach – Agreements, principles and practices for describing an architecture, established for a particular application area and/or by a particular community of stakeholders.

Information architecture consists of a set of techniques and tools that describe the information model of a system. Information architecture includes:
- databases and data warehouses;
- information flows.

Functional subsystems of an information system are task complexes with a high degree of information exchanges (links) between tasks. The composition of functional subsystems is largely determined by the characteristics of the information system, its industry affiliation, size, nature of the enterprise. The composition, order and principles of interaction of functional subsystems are established taking into account the goal facing the object.

Functional subsystems of an information system can be formed according to various principles. Each functional subsystem is characterized by:
- its specific object of management;
- external inputs and outputs;
- an internal relatively closed information system;
- a special range of tasks that arise and are solved in the management process.

From the point of view of network architecture, file-server, client-server and web architectures are distinguished.

File server applications use a server to store program code and data, and data processing occurs only on the client side. This architecture is similar to local applications.

Client-server applications use servers to store the back end of the application and the database server. The client part stores the client part of the application (including the client part of the database management).

Web Applications are characterized by storing all the data and business logic of the application on the server, and only the application for interacting with the server is stored on the client side (similar to a “thin client”).

Cloud services provide the ability to use any of the network architectures listed.

Cloud services provide technologies for distributed data processing, when using which the user receives access to computing resources and other capacities in real time via the Internet.

There are 3 types of cloud services:
- public - provide cloud computing technology to any user who needs it. In this case, the user pays all the costs of maintaining the servers as a subscription fee. Servers are managed and maintained by the owner of the cloud service;
- private - provide cloud computing technology only to their organization. As a rule, such clouds are located in the building of this organization, and full-time employees are engaged in management and maintenance;
- hybrid - a combination of the two previous species. It can be used by organizations, the load on which depends on seasonality, i.e. the normal mode of operation uses a private cloud, and if necessary, you can increase the resources using public clouds.

4 Conclusion

In the course of the research work, a method for accounting for serialized items was developed, and an information model for accounting for serialized items was built. As part of the design of an information system, various architectures and principles for building an
information system were studied, the structure and functions of the system were developed, and the necessary hardware for building the system was analyzed. In the course of studying the necessary technical support, the advantages of cloud services were studied.

References

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