Design of an intelligence information system of airport services automation

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Abstract – The article is devoted to the development of the information system for the airport activity automation. This system will be useful in an airline ticket choice .

Key words – system, airport, information system, management resources, ticket, automation of airport.

I. Introduction

Nowadays aviation branch is one of the most important in the economy. It is the youngest, the fastest, but also the most expensive transportation. Among other modes of transport has the greatest advantages of air as the speed of delivery of cargo as well as passengers. Important to improve the efficiency of air transport is to identify trends and research of features air transport passenger transport terminals.

Currently, airport information structure includes a variety of information systems that provide purchase and reservation of tickets, passenger services, passport and customs control, control of aviation security, etc.

The need for permanent development and growing number of new products that use proven methodologies and modern development that can simplify and improve the process of choosing and booking the important task is to develop a system of automation services Airport [1].

The purpose of the development of airport services automation system with improved user interface and workflow according to analog systems, therefore the development of an information system designed to automate the airport services is an urgent task.

The aim of this work is to develop an information system that is designed to automate service airport.

During the performance delivered the following tasks:

1) to analyze the known means of choice of air tickets and assess their compliance with the subject area to determine their deficiencies and prevent their recurrence in the developed information system to identify and realize the benefits of the new system;

2) build a conceptual model of information system automation of the airport, which would make it possible to present the work of the future information system showing its structure;

3) to choose methods and means for the implementation of information systems;

4) design online resource selection and order ticket according to criteria that would make it possible to search for flights and accuracy with ease and choose the cheapest and fastest flights that meet the criteria.

II. Analytical Review of Various Sources and Methodological Bases of Research

Requests for air transport services in the world are growing steadily for several decades. The number of passengers traveling by air has increased by 45% over the last decade and increased threefold since the mid-nineties of the twentieth century. In 2011 air transport services to proceed and 18.3 million passengers were transported 85 million tons of cargo. Nine hundred leading airlines serviced by a thousand international airports, creating a route network of several million kilometers. If the world's airports in the near future will not be able to overcome the lack of infrastructure facilities, the global economy could face the inability to further expand the set rate. Today, in the world are actively measures to improve airport development [15]

In recent years there has been steady growth in the role and importance of air transport in interstate traffic. Air transport has advantages over other modes of transport in the speed of delivery of cargo as well as passengers. Building a network of airports depends on many factors: market demand, government license agreement, the desire of investors to create such a network. In addition it can directly depend less on global factors: the needs of society or from the actions of competitors. However, with the present development of air transport and its growth expectations existing systems are able to cope. Analysis of the issues involved Lozhachevska, Palamarchuk, Bulova and others [7, 8, 9, 10]. However, scientific work which would have covered current trends airports, unfortunately, are largely absent. Air transport as a mirror reflecting the state economy. Unfortunately, the past two decades the development of air transport can not be called a success.

The modern state and prospects of development of airport network characterized by the following factors:

• the number of airports and airfields that are approved for use;

• As fixed assets of airports and airfields;

• ownership of property airports and airfields;

• land issues;

• interdependence of airports and other elements of the air transport system;

• current trends and projects the concept of airport activity

As a result of inadequate funding of airport infrastructure for a long time does not solve the problem of physical and moral deterioration and shortage of production capacity of the maintenance hangar complexes and deficit.

Based on the analysis of the state and prospects of the air transport system should be noted that the last 10 years in the field of air transport Ukraine have been significant changes [6]:

- The market aviation flights in the country has changed dramatically, with its main characteristics were its considerable economic freedom and intense competition;

- Significantly reduced the volume of air transport and aerial work;

- Most airports are in a difficult financial position, which does not allow either to develop or maintain their infrastructure;

- The airline experienced a process of corporatization, separation into independent airlines and airports;

- Outdated normative database holding back the development and functioning of the aviation market and the industry as a whole, leaving it without a future and almost erasing from the world aviation community.

The general trend analysis of economic governance in aviation passenger traffic made by such scholars as

Richardson, Dohanis, Salk and others [12,13,14,15]. However, scientific work, which clearly was covered to current trends feasibility study capacity and its impact on the efficiency of the airport, unfortunately, no.

III. System Analysis of Services Airport Automation Systems

To ensure the successful development of any complex information system necessary to conduct a detailed qualitative and systems analysis the subject area that will clearly define the aim and purpose of the system being developed, to understand the structure and mechanism of its operation, to generate selection criteria leverage system.

Analysis of the research object and subject area was carried out not by some defined methodology, and according to common principles and stages of system analysis set out in [5]. System analysis aimed at solving complex problems. The problem arises when there is a difference between the desired and actual, that is abstract category, reflecting people's understanding of their motives. The purpose of the CA to a particular problem is to increase the degree of validity of decisions taken, and to overcome the above difficulties.

Information system - a collection of information resources, technical means and methods of information processing. The work is an information system [5]:
- storage;
- data processing;
- delivery of information.

The task is to study methods and the development of software and algorithmic solution which will allow to automate the process of selecting and using one of the best flight offers implementation, selected on the basis of production and associative rules defined algorithm to find the shortest path. Optimality criterion is to maximize customer savings on new terms compared with the current Terms of airline services. This system should be developed using limited computing resources, meet stringent requirements for response time and calculation errors as well as integrate with existing systems.

The developed system should provide prompt information to customers about changing payment routes, to advice on choosing the optimal air carrier and to offer relevant advice on the implementation of choice of flight, including those that allow you to save money. Defining the problem, it can offer the following solutions. You must create a system that would not require significant costs for deployment and subsequent operation and have implemented the most popular, relevant and economically viable at present the possibility of using the Internet to air transport [3].

The conceptual model defines user requirements that are issued in the form of diagrams. Thus, designing a conceptual model based on the data analysis tasks that must be solved in the information system.

Doing development information system automation of the airport, was set up multiple diagrams that facilitate the process of its creation.

Activity diagram shows the complete process of the system (fig.1.):
1) user authorization;

2) data fall into a search engine where connecting of the database;
3) after making the request;
4) later revised request falls into a search engine where connecting of the database;
5) formed results;
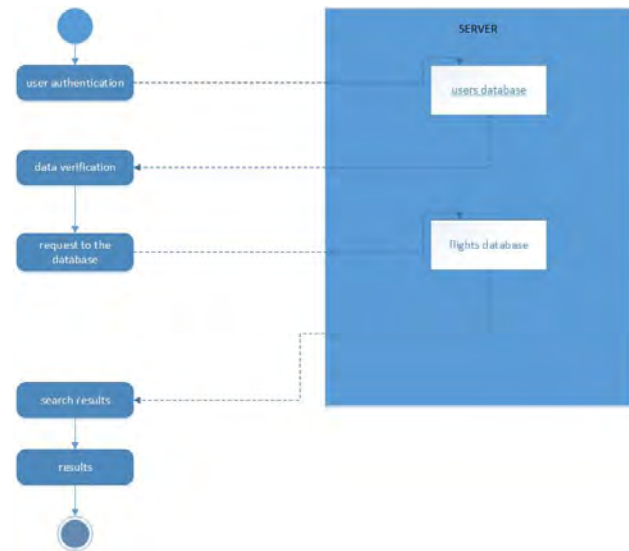6) in the end ticket sent to the user.

Fig. 1. Activity diagram

In the process of object-oriented software development is the need to distribute software solution components between the members of the development team and subsequent reuse of code [4]. The means of modeling in UML, which makes it possible to aggregate individual components into groups depending on their purpose logic in the system is the concept diagram components (Fig. 2). Each component has all the elements that belong to him, while he may be a component part of another component.

Graphically component denoted the relevant box, which has a unique name and is connected to the other packages using communication indicating the ratio of nesting.

This chart shows the relationship between software components, including source code components, binary components, and components that can be done.
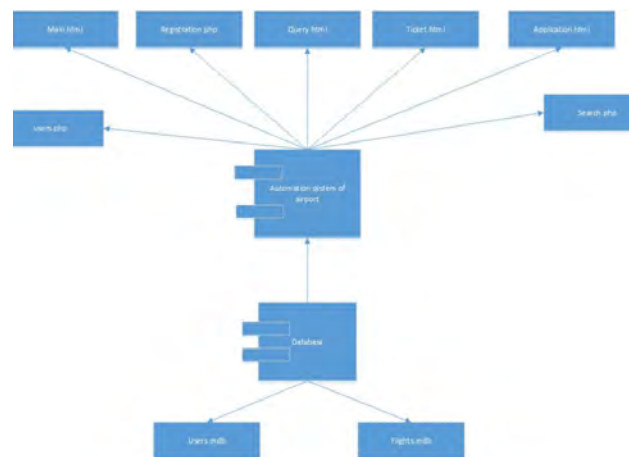

Fig. 2. Component diagram

Sequence diagram (Fig. 3) shows the order of operations of the system over time. Initially, the user enters login information, then the system of checks is or authorization or user registration. Thereafter, the user is given permission to work in the system (under the correct resolution here refers Authorized data or successful registration), after which the user makes a request. The request gets to the processing system and is searching the database. At the end of the user provided results - design result in a ticket.
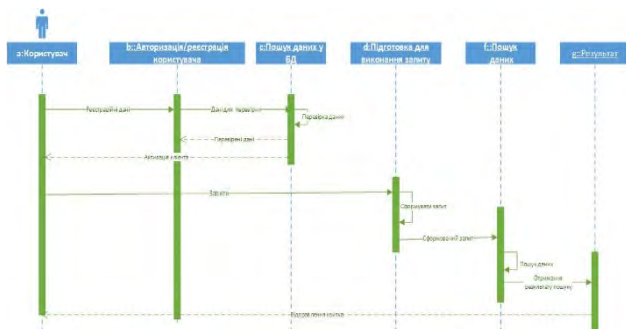

Fig. 3. Sequence diagram

IV. Methods and Means of Creating Intelligent Information System of Airport Services Automation

There are three key approaches to building automation information system of the airport. The first is the previous definition of customer operations. The disadvantage of this approach is biased customer in selecting the optimal flight. The second approach is to use "historical" data, ie real data over time for volumes of flights subject to certain rules of cost accounting client. The third approach is the algorithm for finding the shortest paths with the least waste of time.

The second and third approaches are justified but require a significant amount of computing resources for storing and processing data. Part of the system, in terms of architecture can be implemented as an Internet resource of choice for the ticket. Such a solution designed to meet the need for cost analysis not only the individual user, but also a massive need for required configuration and integration with self-service client to simultaneously receive advice and do them[1].

Authorizations manual is standard - unauthorized user specifies a login and password information system checks whether the database is a username and whether it set a password if so, information system assigns the user certain rights defined by the administrator or information system, and provides access to information in the system. If the test is over login and password are not successful, the information system notifies and prompts Correct data. A very important component of the system is its administrative part, through which manages the system. Enter the administrative part are entitled only to people belonging to the group "Administrators". They can change the design of Web systems, create, edit new user roles, establish their rights, create new users, edit existing users to associate users with roles administer content updating.

As for the methods of implementation, it is possible to apply associative and production rules and alhortym finding the shortest path.

Algorithms for detecting associations are rules on individual items that appear together in the same economic transaction, such as buying one. These rules can find consistent associations that have a time reference. Suppose a database that contains purchasing transactions. Every transaction - a set of tickets that are purchased at a time.

The purpose of the analysis is to establish dependencies: if the transaction there is a set of A, then one can assume that this transaction may be set and B. The establishment of such dependencies allows then find and intuitive rules of conduct buyers.

As a result, the practical implementation was developed database schema, its structure, tables and relations between them, placed restrictions on the field. Testing of the system several times with the introduction of different values and made verification and validation of data when entered false data. The control sample was analyzed. As a result of the practical implementation can conclude that all system components have been fully tested and the system implemented successfully. The rules are organized in the form of IF-THEN structures called production rules. Production rules, with the interpreter that manages their activation depending on the available facts, constitute production system presentation and use of knowledge in expert systems. Such systems are called productive.

In the productive systems of knowledge represented by the set of rules against which draws conclusions that have to be made (or not made) in different situations. Conclusions are made on the basis of methods of direct or reverse inference. Depending on the method of inference are two types of production systems: direct systems with logical conclusion and systems with reverse logical conclusion. The overall strategy is to meet the challenges of smashing them into pieces that can be easier to prove. Thus, the system of direct logical conclusion administered by the facts. They begin their work known elementary facts and continue using the rules for making findings or perform an action. Systems with reverse logical conclusion guided by hypotheses. They begin their work on the hypothesis or purpose that the user is trying to prove and still, finding rules that will prove the truth of the hypothesis. Widespread use of systems based on production rules, due to the presence of the following features:

1) modular organization. Thanks to its modular organization simpler knowledge representation and expert system expansion, increasing its capacity step by step;

2) the availability of explanation. Productive expert systems using rules make it easy to create a means of explanation. Explanation track sequence activated rules and, on this basis, provides an opportunity to restore the reasoning that led to a conclusion;

3) availability of analogies with human cognitive processes. According to the results obtained Newell and Simon, the rules are a natural way of modeling the process of problem solving person. Finding the shortest path used almost everywhere, from the construction of the optimal route between two objects on the ground (such as the shortest path from the house to the university) for use

in autopilot systems to find the optimal route when flying, switching information package on the Internet, etc. . The shortest path is seen with a specific mathematical object called graph. There are two most effective algorithms for finding the shortest path [25]:

• Dijkstra's algorithm (used for finding the optimal path between two vertices);

• Bellman-Ford algorithm (for finding the optimal route between negative pairs of vertices).

Conclusion

In this paper are developed information system for automation of airport services. This system is designed to assist the user in choosing an airline ticket.

As a result of developing a system able to solve the following problems:

• analyzes of known drugs of choice tickets and assessed their compliance with the subject area, which resulted in the exclusion of the main functions of the system being developed, also identified their weaknesses and not allowed to repeat them in the developed information system, and implemented by the benefits of the new system;

• built a conceptual model of information system automation of the airport, which made it possible to present the work of the future information system showing its structure;

• The choice of methods and means for the implementation of the information system, allowing us to develop effective algorithms and methods of choice of air tickets;

• designed online resource of choice of air tickets according to criteria that made it possible to search for flights and choose the cheapest and fastest flights that meet the criteria.

The work is a complete system that is designed to automate service airport and providing recommendations on choosing the airline that provides the following functions:

• choice ticket for the relevant criteria;

• finding the cheapest and fastest flight;

• provide information for passengers;

• provide additional information about services flights..

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