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Development of online taxi ridesharing application

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Abstract. The paper highlights the main principles and modalities for developing a mobile application for sharing the ride via online taxi based on the use of innovative software elements and logistic flow management models. The proposed approach for the development of application is based on the latest marketing course, the use of logistic models and the elimination of analogues.

Key words: route development, taxi ridesharing application, database of orders, messaging, user identification, request processing, customer.

INTRODUCTION

Today public transportation services are very common for modern society, whether it is a traditional taxi or newer mobile-powered startup like Uber. Using these kinds of public transportation is not environmentally friendly, and does not reduce the car number on the roads or the amount of air pollution generated by vehicle engines. People are fully aware of the "smart cities"; infrastructure that relies upon digital information and communication technologies to make city living more efficient, more ecologically aware, and healthier [1].

The purported benefits from increased ridesharing are substantial. A successful rideshare scheme could, from a societal perspective, reduce fuel consumption and emissions, reduce congestion during peak travel periods, reduce parking costs for travelers and employers, provide a reliable alternate mode for travelers, and promote greater equity in transportation by ensuring that mobility is maintained for lower income travelers. For commuters, major rideshare benefits include travel time savings, cost savings and increased mode choices [2].

For employers, reduction in the cost of providing parking and improvements in worker productivity brought about by less stressful commutes are two of the primary potential benefits.

Yet even with such a substantial number of benefits to a variety of transportation stakeholders, interest in ridesharing among travelers has remained relatively low. While ridesharing as a journey-to-work mode has remained relatively stable for the past five years (10–11 %), the fact remains that it is still half as popular as it was in 1970 (20.4 %) [3].

One of the main ways in which that could be accomplished is through innovations designed to reduce road traffic congestion. The concept of ridesharing online taxi application is providing us with an opportunity to reduce pollution, implement sharing economy in the terms of sustainable development.

Smartphones have proven to be game-changers in the recent rise of urban transportation alternatives. Connecting via smartphone with online taxi ridesharing company by downloading an application with maps and route-planning tools. This type of communication is efficient and instant. With ecological awareness at an all-time high, these factors have combined to make ridesharing an increasingly prominent part of the contemporary transportation conversation [4].

In recent years, an innovative ridesharing service relying heavily on advanced mobile phone technologies known as "real-time" ridesharing, or "dynamic" ridesharing has gained in popularity. Traditionally, rideshare arrangements between two or more unrelated individuals for 45 commuting purposes have been relatively inflexible, long-term arrangements. "Real-time" ridesharing attempts to provide added flexibility to rideshare arrangements by allowing drivers and passengers to arrange occasional shared rides ahead of time or on short notice. The addition of this service innovation presents a number of opportunities to overcome existing rideshare challenges [2, 5–7].

The main aim of this article is to introduce the idea of contemporary environmentally aware online taxi ridesharing application that is suggested as one of the solutions for modern "smart world".

Stating the Research Problem. Despite numerous environmental problem cautions there is still a lack of promising approaches to effectively change peoples´ transportation mean towards sustainable solutions. By introducing the project in order to settle the process of ride sharing for commuting travel, this work will contribute to address the problem of single occupancy driving. By implementing an online taxi ridesharing application for commuter travel in real-life circumstances this work views ride sharing from a new perspective and thereby aims to gain new insights and to attempt to get one step closer to solve the problem of consumer behaviour change.

RELEVANCE OF RESEARCH

Development fundamental factor of such a service is its unique combination of carpooling and ridesharing analogues like Blablacra and Uber respectfully.

In substantiating the topics of the project, the market of the transportion industry was taken into account by making comparisons with analogues. The information which was obtained during the research showed high competitiveness in the market and compliance with the general requirements of the characteristics, criteria for evaluation, comparison, and quality requirements.

Compliance with general requirements:

- *unification:* the software product is unified by one system;
- *interoperability*: the system is open only for interactions with internal systems, and systems that interact only with elements of the developed software;
- *mobility*: the software has the ability to ship from one operating system to another;
- *user interface*: a user-friendly interface is available with many options.

The quality requirements of FURPS + give high praise to the project as a justification for its implementation.

One of the advantages of this system is the ability to combine many genres into one system thereby increasing the customer market and attracingt more users from different genres in one system.

The development of the project is based on purchases, and subscriptions to the developed system. Attracting funds is a system of donates is also one of the ways of development through attracting additional funds.

The developed project is a combination of a login application logon, which protects your personal data, and the main platform. An application itself as a startup system for a developed project selects a test version or a paid subscription. When using a paid subscription, it is possible to use the system in its entirety without functional limitations in the test version.

Within the framework of the developed project, the following main processes will take place:

- *user registration*: if the user information in the database is not available, the system invites him to register to continue to work on the site with the help of Facebook or Google accounts.
- *ordering*: the system creates a new entry in the Order database and automatically brings to it all the details of the order received. Within this process we distinguish:

a) customer location data : the user enters his address or indicates his location on the map;

b) destination data: the user enters the destination address or marks it on the map;

The project is more innovation oriented towards both the software aspect, the marketing component and the logistics model. Innovative marketing aspect and economic progress in reaching a large number of users from different areas of interest, with the use of various routes of the gaming industry. This, of course, has a direct relationship with current ridesharing trends. As people continue to come together in new ways, transportation itself will keep changing and innovating.

It took the technological revolution, and the brand-new ways of thinking about the man-nature balance to bring it back in a big way. But it’s back, and it’s here to stay. As traffic congestion, urban pollution and social disconnectedness continue to pose major challenges which this project aims to solve. The design of the processes will equitably split the cost of the ride among the passengers as well as to fairly distribute the economic benefits of ride sharing between the drivers and the passengers. Finally, it is actually helping bring people together in “never before seen” ways and reawakening communities and the sense of interconnectedness that is so vital to life satisfaction.

DESCRIPTION OF THE PROJECTED SYSTEM

The “Online Taxi RideSharing” system is intended for a simplified and optimized method of ordering a taxi by several users simultaneously for 1 trip. The idea is to create an app that will sync with Google Maps and Privat24 to order a taxi online.

According to the idea – people who are located in one location (dormitory, educational institution, city center, office center) and plan their trip with approximately the same destination (railway / bus station, city center, educational institution, hostels, etc.) can use the service. The program will independently indicate the time of arrival to the customer and to the destination. This will solve the problems of road congestion, which will reduce the level of traffic accidents and improve the ecology of the city.

The system is designed to support the online taxi by improving the organization of work processes, keeping accounts, locations, and other materials electronically, giving users access to the respective roles, and increasing the achievement of maximum simplicity and efficiency of the communication process and the interaction of people directly involved. before the operation of an online taxi order.

The system is aimed at the maximum simplification of the mechanism for monitoring the order and monitoring its implementation by supporting the ability to conduct online car navigation. Implementing the functionality associated with sending and receiving messages within the system enables effective communication between drivers, customers and administration. Using the projected system also allows customers to access the necessary data for the driver, route and other customers.

Within the projected system, you can distinguish four subsystems:

- Subsystem “Route Development”;
- Subsystem “Database of orders and control of successful trips”;
- Subsystem “Messaging”;
- Subsystem “Identification of users and processing requests”.

SUBSYSTEM “ROUTE DEVELOPMENT”

The “Route Development” subsystem is part of the “Online RideSharing Taxi” system, which is responsible for maintaining and updating the database of customers and drivers, relevant routes, and providing access to these data to users of various roles.

The input for the subsystem are defined search criteria (for example, where and what time a taxi should get to the customer, how many passengers are going to be during the route, etc.), as well as the keys to access the selected training materials. Having worked out the received input, the system provides the customer with the opportunity to use the information when the driver arrives at the destination, how many passengers there are in the car, at what time the customer will arrive at the address.

The subsystem provides the ability to perform the following functions:

- replenishing the customer base, adding new ones and editing existing data;
- searching for the required customers according to the specified criteria (address of the order, district, number of similar orders, etc.);
- reviewing available customers by the specified search criteria;
- verification of access keys to relevant customer data;
- ordering, checking and saving results on order in the system database.

Given that the specificity of the operation of a subsystem depends directly on the role of the user, it is advisable to consider two variants of the modular structure of the system – for the user with the role of Driver or Administrator (Fig. 1) and the user with the role of the Customer (Fig. 2).

SUBSYSTEM “DATABASE OF ORDERS AND CONTROL OF SUCCESSFUL TRIPS”

The “Database of orders and control of successful trips” Subsystem is part of the RideSharing Online Taxi system, which provides users with various roles the ability to edit and / or view order data that includes performance data, compilation route results, or optimal results, as well as to formulate and process statistics of user satisfaction by the specified criteria.

The input data for the system is the information that the customer makes in a single database of oneself when they are filled in - the house, work, favorite places, etc. This data is stored in the database and is available for editing and / or viewing to users depending on their roles in the system. Another type of input data within the subsystem described is defined search criteria. Having worked out them, the system provides the user with access to the necessary information presented in a convenient and visual form.

The subsystem provides the ability to perform the following functions:

- creation of the database of orders by the administrator of the system – entering data about the driver and customers, data on the order, determining the mode of access;
- introduction of information to the database by the driver – entering information about the route, the material passed, homework for students-participants of the course, etc.;
- reviewing customer order history, drivers and system administrator;
- making the results of the completed order by customers to the database;
- reviewing statistics of drivers' performance, formed according to certain criteria determined by the administrator;

checking access mode and access keys to grant permission to edit and / or view necessary data (Fig. 3).

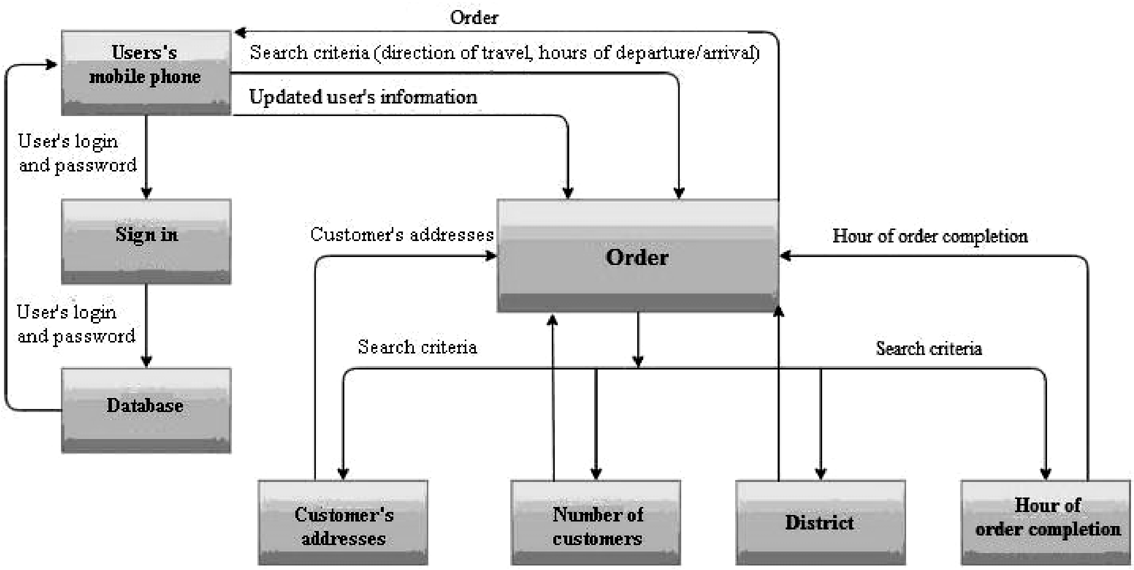

Fig. 1. Model of the subsystem “Route Development” for the user with the role of Driver or Administrator

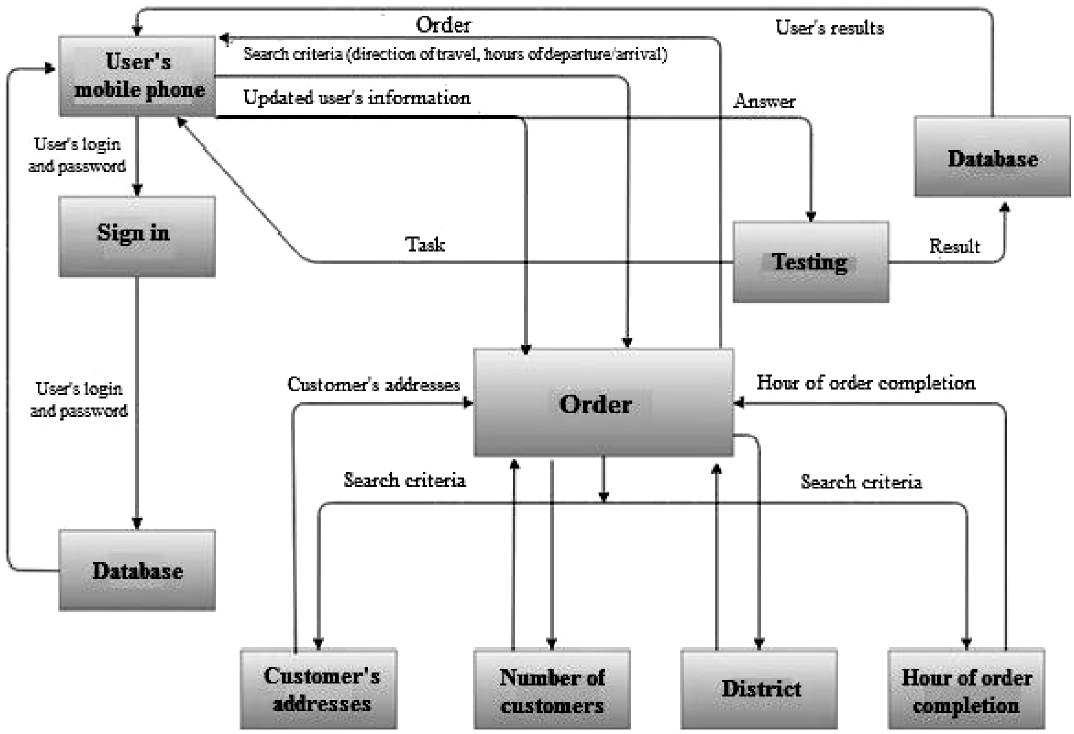

Fig. 2. Model of subsystem "Route Development" for the user with the role of the Customer

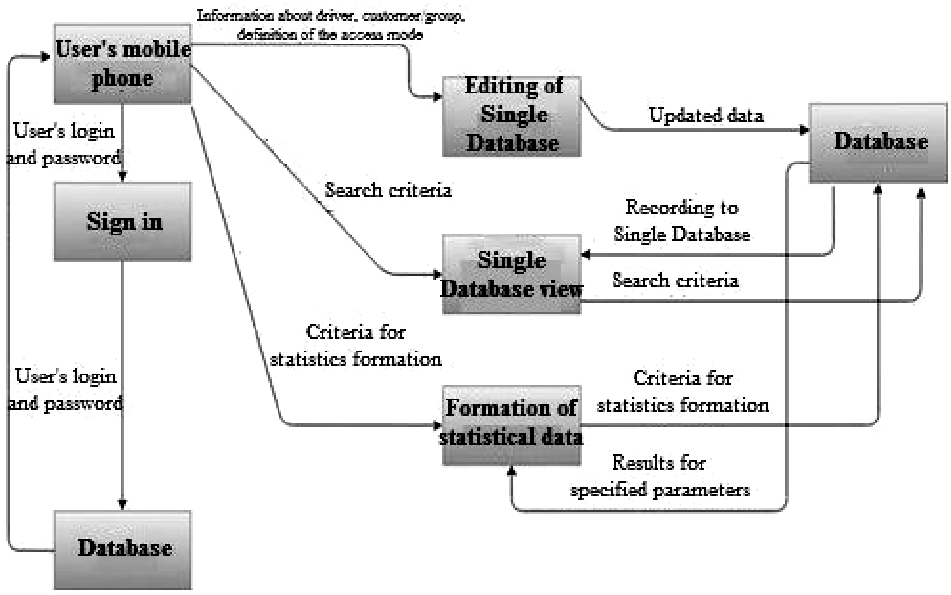

Fig. 3. Model of the subsystem "Single order database and travel control control" for the user with the role of Administrator

The operation of a subsystem depends directly on the role of the user, it is advisable to consider three variants of the modular structure of the system - for the user with the role of the Administrator (Fig. 4), the user with the role of the Driver and the user with the role of the Customer (Fig. 5).

SUBSYSTEM "MESSAGING"

The "Messaging" subsystem is part of the "Online RideSharing Taxi" system, which provides the ability to exchange messages between individual users or groups of users. Such a feature greatly simplifies the process of disseminating important information or useful files, and facilitates effective communication between users of different roles.

The input for the subsystem is information about the recipient/s and the text of the message itself. As soon as the message is sent, it is displayed on the corresponding page in the recipient's personal cabinets, which can view or respond to it [14]. Access to the received and sent messages subsystem provides, after processing user data.

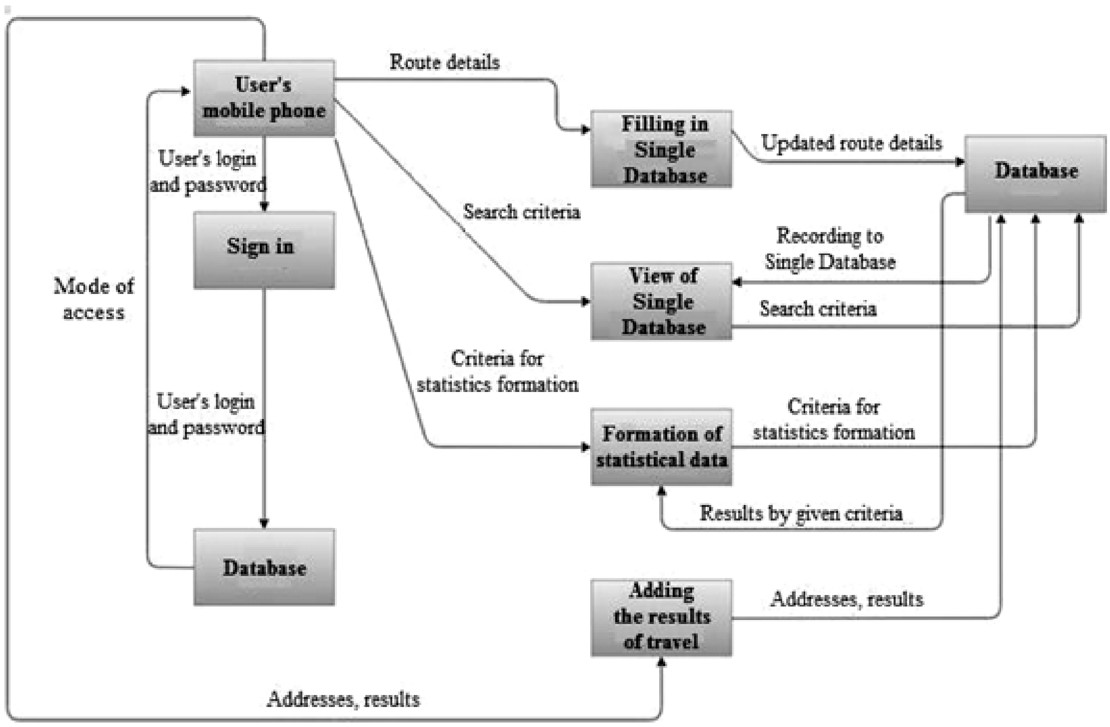

Fig. 4. Model of the subsystem "Single order database and trip control" for the user with the role of driver

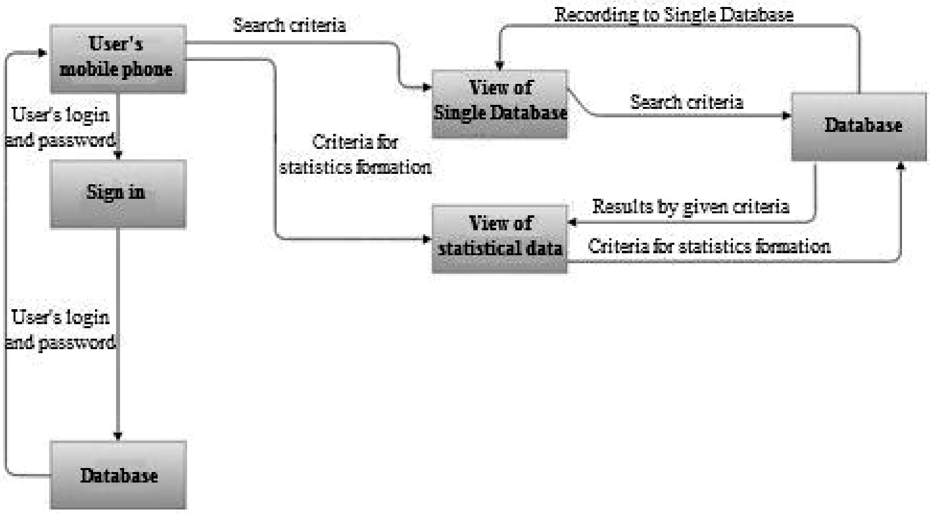

Fig. 5. Subscriber model "Single order database and travel control control" for user with Customer role

The subsystem provides the ability to perform the following functions:

- creating and sending messages to individual users or groups of users of different roles;
- search and view messages received or sent by the user of the system, according to the criteria he/she has defined.

Since the specificity of the functioning of the subsystem does not depend on the role of a particular user, it is expedient to consider only one variant of its modular structure (Fig. 6).

SUBSYSTEM "IDENTIFICATION OF USERS AND QUERY PROCESSING"

The subsystem "User Identification and Request Processing" functions as part of the "Online RaidSharing Taxi" system and is responsible for processing user identification data for determining the access mode, as well as performing user queries. The input data for the subsystem is primarily the identity of the user. It is on the basis of these data that the definition of the access mode, on which depends the functioning of individual subsystems of the projected system. The subsystem is also responsible for processing data generated in the form of requests for searching or editing information stored in databases.

The model of the subsystem "Identification of users and query processing" is shown in Fig. 7.

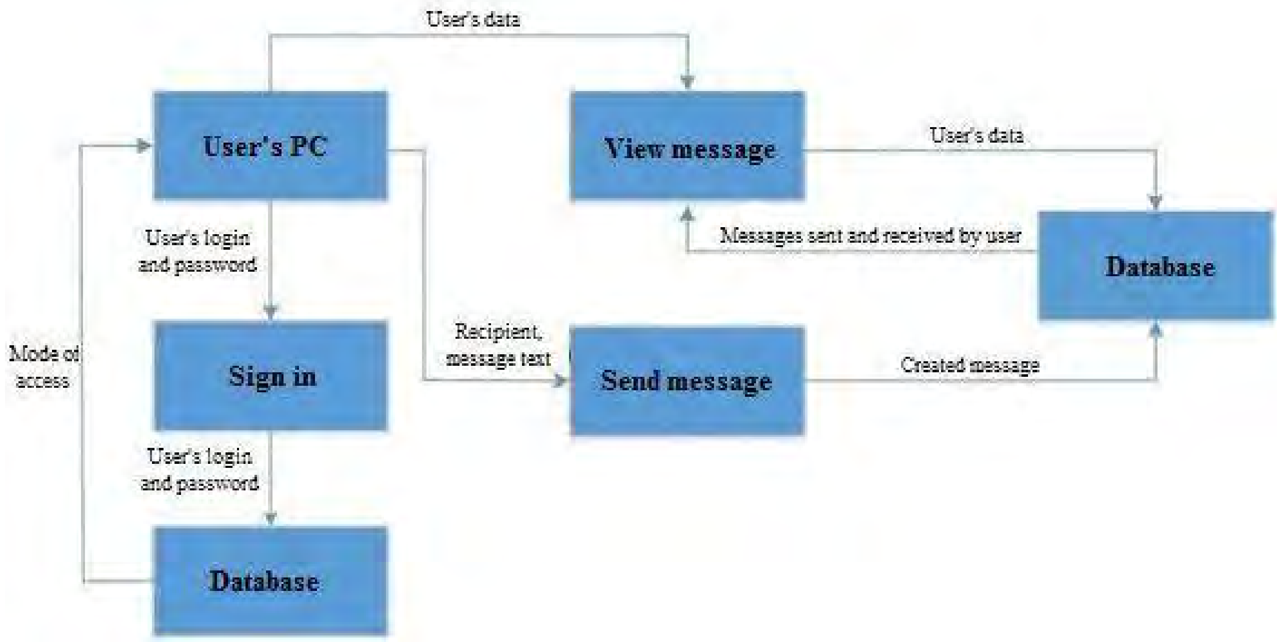

Fig. 6. Modular structure of the subsystem “Messaging”

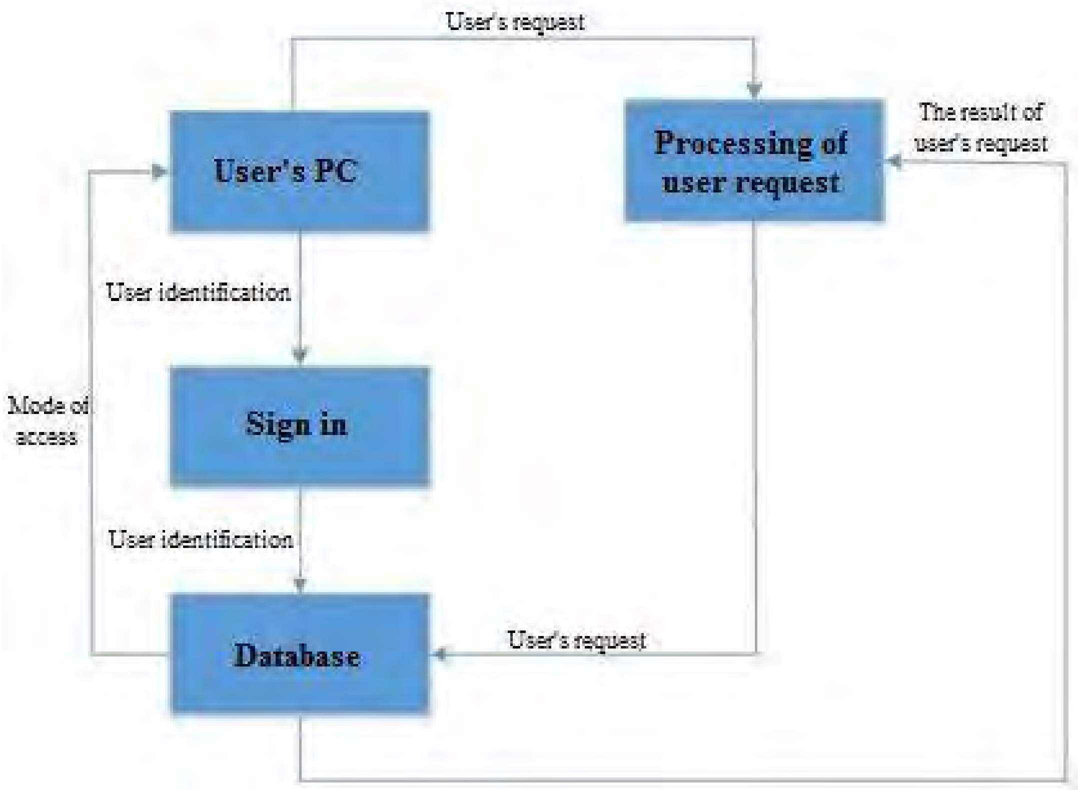

Fig. 7. Subscriber model “Identification of users and query processing”

MODULAR STRUCTURE OF THE SYSTEM

The projected “Online Taxi RideSharing” system consists of four subsystems – “Route Development”, “Single Ordering Database and Travel Controls”, “Messaging” and “User Identification and Request Processing”, the latter of which is responsible for the interaction of system modules with The database is an intermediate link between the user and other subsystems. The modular structure of the projected system, which clearly demonstrates the interconnection between its elements, can be seen in Fig. 8.

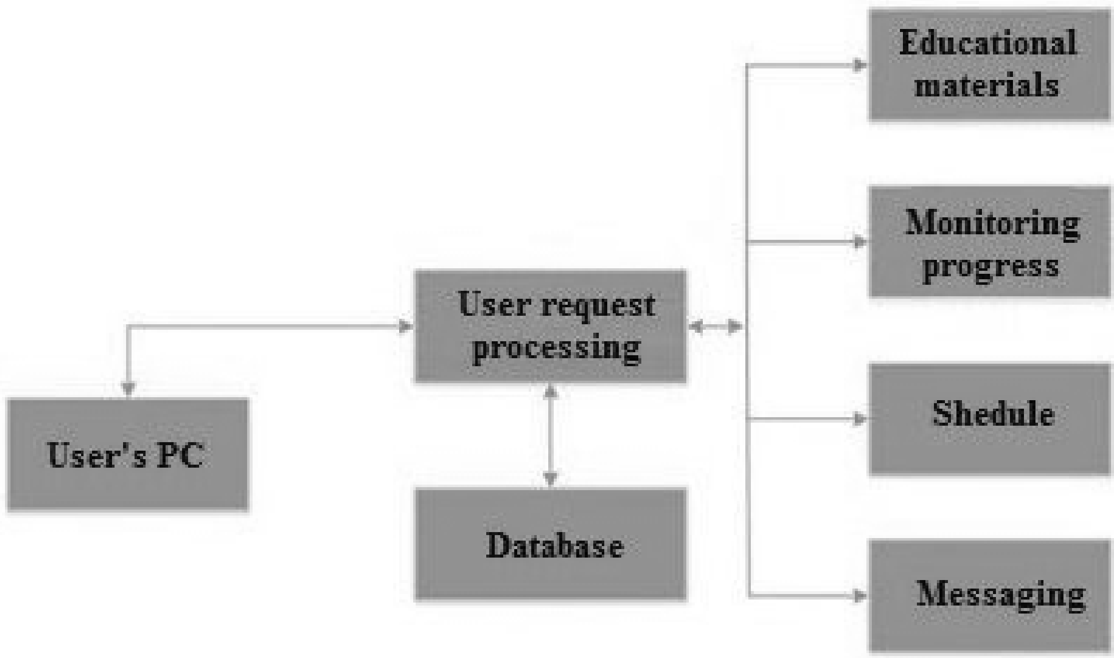

Fig. 8. Modular structure of the system "Online taxi RideSharing"

CONCLUSIONS

The project is innovative in various aspects, which gives a high distinction from analogues, which is not a negative feature, but rather a high indicator of competitiveness and uniqueness. The work on such elements is unique both in technical terms and in terms of ideas, marketing process and the project as a whole.

REFERENCES

1. **Goldman J., Conservation. 2014.** University of Washington How carpooling save the world. Access mode: http://www. conservationmagazine. org/ 2014/09/how-carpooling-will-save-the-world/.
2. **Andrew M. Amey. 2010.** Real-Time Ridesharing: Exploring the Opportunities and Challenges of Designing a Technology-based Rideshare Trial for the MIT Community. Access mode: https://ridesharechoices. scripts. mit. edu/home/ wp-content/papers/AMEY_Thesis_Final. pdf.
3. **Amey A., Attanucci J., and Mishalani R. 2011.** Real-Time Ridesharing, Opportunities and Challenges in Using Mobile Phone Technology to Improve Rideshare Services. Transportation Research Record, Vol. 2217, 103–110.
4. **Stach C. Stuttgart**. **2011.** Saving time, money, and the environment–vHike, a dynamic ridesharing service for mobile devices. IEEE International Conference on Pervasive Computing and Communications Workshops, 352–355.
5. **Yaoli Wang, Winter S., and Tomko M. 2018.** Collaborative activity-based ridesharing. Journal of Transport Geography, Vol. 72, 131–138.
6. **Zhuo Chen, Xiaoyue Cathy Liu, and Ran Wei. 2018.** Agent-based approach to analyzing the effects of dynamic ridesharing in a multimodal network. Computers, Environment and Urban Systems. In press.
7. **Yasaman Amirkiaee S., Nicholas Evangelopoulos. 2018.** Why do people rideshare? An experimental study. Transportation Research Part F: Traffic Psychology and Behaviour, Vol. 55, 9–24.
8. **Cetin T., Deakin E. 2017.** Regulation of taxis and the rise of ridesharing. Transport Policy. In press.
9. **Xuan Di, Rui Ma, Henry X. Liu, and Xuegang (Jeff) Ban. 2018.** A link-node reformulation of ridesharing user equilibrium with network design. Transportation Research Part B: Methodological, Vol. 112, 230–255.
10. **Farhan J., Donna Chen T. 2018.** Impact of ridesharing on operational efficiency of shared autonomous electric vehicle fleet. Transportation Research Part C: Emerging Technologies, Vol. 93, 310–321.
11. **Qian-Ping Gu, Jiajian Leo Liang, and Guochuan Zhang. 2017.** Algorithmic analysis for ridesharing of personal vehicles. Theoretical Computer Science. In press.

12. **Weiwei Jiang, Carlos Ruiz Dominguez, Pei Zhang, Max Shen, and Lin Zhang. 2018.** Large-scale nationwide ridesharing system: A case study of Chunyun. International Journal of Transportation Science and Technology, Vol. 7, Iss. 1, 45–59.
13. **Huayu Xu, Jong-Shi Pang, Fernando Ordóñez, and Maged Dessouky. 2015.** Complementarity models for traffic equilibrium with ridesharing. Transportation Research Part B: Methodological, Vol. 81, Part 1, 161–182.
14. **Rashmi P. Payyanadan, John D. Lee. 2018.** Understanding the ridesharing needs of older adults. Travel Behaviour and Society, Vol. 13, 155–164.