Research on the Framework of Provincial Online Car-Hailing Supervision Platform in China

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Abstract: Under the background of the rapid development of online car-hailing, the information supervision platform plays an irreplaceable role in the supervision of the daily operation of online car-hailing. In 2016, the state organized the construction of a ministerial level online car-hailing supervision platform to provide basic supervision modules and clients for provinces and cities to meet the basic supervision needs of all localities. However, the ministerial online car-hailing supervision platform cannot deal with the data pertinently and is a passive receiver of information. Therefore, it is very necessary to build a provincial online car-hailing supervision platform. This study analyzes the business and functional requirements of the provincial online car-hailing supervision platform, clarifies the engineering boundary with the national platform, carries out research from four aspects: overall architecture, business architecture, logical architecture, and technical architecture. The final research result is the framework of provincial online car-hailing supervision platform.

Keywords: Online car-hailing，Provincial Supervision Platform，Platform Framework

1 Introduction

1.1 Development status of online car-hailing

In recent years, benefiting from multiple factors such as technological innovation, consumption upgrading, capital investment and policy environment, China's online car-hailing has developed rapidly and has become an important focus to cultivate and form new drivers of economic development under the stage of China's economy from high-speed growth to high-quality development. The rapid development of online car-hailing has played an important role in better meeting the diversified and personalized travel needs of the public and driving the transformation and upgrading of the industry.

As of February 2022, 232 online car-hailing platform companies have obtained business licenses nationwide, including large-scale national platforms such as DIDI, SHOUQI, SHENZHOU and CAOCAO, as well as small and medium-sized platforms such as SUNSHINE

ICIDC 2022, June 17-19, Qingdao, People's Republic of China

DOI 10.4108/eai.17-6-2022.2322606

Travel, AA Travel, and XINGHUI Travel, but with relatively small market scale and few operating cities. The total number of orders in the national online car-hailing industry is 551 million, including 11 platform companies with monthly orders of more than 1 million, including DIDI, T3, CAOCAO, HUAXIAOZHU, MEITUAN, WANSHUN, XIANGDAO, RUQI, SHOUQI, SUNSHINE Travel, and XIEHUA Travel. The provinces with large orders are Guangdong, Zhejiang, and Jiangsu. From the overall situation in recent years, except that the order volume decreased due to the epidemic in the first half of 2020, the order volume of online car-hailing industry remained relatively stable, with an average monthly order volume of about 600-700 million.

1.2 Current situation of online car-hailing supervision

In 2016, the Ministry of transport organized the construction of a ministerial level online car-hailing supervision platform[1], made it clear that the platform adopts a data centralized architecture to realize the access and summary of the national online car-hailing industry data, and the ministerial level online car-hailing supervision platform forwards the national online car-hailing data according to the territory, providing basic supervision modules and clients for provinces and cities to meet the basic supervision needs of all regions. At the same time, it defines the system architecture, functional requirements, and interface technical requirements of the ministerial online car-hailing supervision platform. In February 2018[2], in view of the problems of incomplete data transmission and poor transmission quality existing in some online car-hailing platform companies, the Ministry of transport further clarified the relevant requirements for data transmission, operation and maintenance of online car-hailing supervision information interaction platform, and carried out monthly and annual evaluation of data transmission quality focusing on data integrity, standardization, timeliness and authenticity, which was regularly announced to the public. The annual evaluation results are linked to the enterprise service quality and reputation evaluation level, which has played an important role in promoting industry supervision.

2 Requirement Analysis

2.1 Business requirements

First, solve the three-level business collaboration. Due to the fixed computing resources of the server of the ministerial online car-hailing supervision platform, the redundancy of the ministerial level online car-hailing supervision platform in the calculation of the massive data resources transmitted by the online car-hailing platform enterprises has been exhausted, so it is impossible to focus on the analysis of the situation of each province and the province[3]. It can only conduct basic analysis through the national common characteristics, which cannot meet the requirements of provincial fine management and intelligent supervision. By building a provincial online car-hailing supervision platform, it can undertake the dynamic and static data of all online car-hailing enterprises distributed by the ministerial level online car-hailing supervision platform to the provincial level, and timely process and statistically analyze the massive data distributed, to meet the needs of industry management in the province[4]. At the same time, we will give play to the effectiveness of data backtracking, overall analysis, and fine guidance for the supervision of online car-hailing in various cities.

The second is to solve the market operation analysis. The online car-hailing operation of cities in the province is different, and the operation of the online car-hailing market in the province cannot be deduced from the situation of a certain city[5]. Therefore, it is necessary to build a provincial online car-hailing supervision platform. Through the comprehensive collection and analysis of online car-hailing information, a Provincial online car-hailing operation analysis data center will be preliminarily formed, and an industry basic database, business database and special database will be established, Realize the dynamic and static data query and statistics of the online car-hailing industry across the province, analyze the scale, structure and change trend of platform companies, vehicles and employees, timely grasp the basic situation, development trend and overall operation status of the online car-hailing industry, and provide differentiated guidance for the development of online car-hailing in different cities[6].

The third is to establish a collaborative supervision system for information sharing. By building a provincial online car-hailing supervision platform, the illegal operation information can be synchronized to the provincial law enforcement and credit information systems in the form of interface[7-8]. The relevant collaborative management departments such as public security, industrialization information, network information and the people's Bank of China can master the operation of vehicles and drivers through the pushed information, to provide guarantee for strengthening the collaborative supervision of online car-hailing.

2.2 Functional requirement

As for the requirements of the management department, first, be able to grasp the basic number of online car-hailing industry in real time and perceive and grasp the situation of provincial and municipal industries; Second, be able to analyze the operation of non-conforming vehicles and grasp the illegal operation of online car-hailing platform enterprises and the access of non-conforming personnel in real time; Third, it can effectively query the operation of non-conforming vehicles and facilitate the fine management of the industry; Fourth, it can accurately enforce the law and effectively crack down on enterprises and vehicles that do not comply with the regulations or carry out illegal business activities[9].

As for the needs of collaborative management departments, the departments that need collaborative management need to master the basic situation of industry operation and online car-hailing compliance in the whole province, such as the operation of online car-hailing platform companies, online car-hailing drivers and vehicle operations, the compliance of online car-hailing platform companies and the compliance of various cities.

3 Research of platform architecture

3.1 Overall framework

The overall structure is centralized, and the data mainstream is from top to bottom, considering the flow of special data from bottom to top. According to the localization needs of industry management, the ministerial level online car-hailing supervision platform distributes the national online car-hailing data according to the territory, to realize the supervision function of provincial and municipal management departments on online car-hailing and meet the supervision needs. The overall structure is shown in Figure 1. As the subordinate platform of

the ministerial level online car-hailing supervision platform, the provincial online car-hailing supervision platform can not only receive the full amount of online car-hailing data of the province issued by the ministerial level online car-hailing supervision platform, but also use the data interface provided by the ministerial level online car-hailing supervision platform to submit special data of the province. The provincial online car-hailing supervision platform reserves the interface ability to access other systems to realize data fusion.

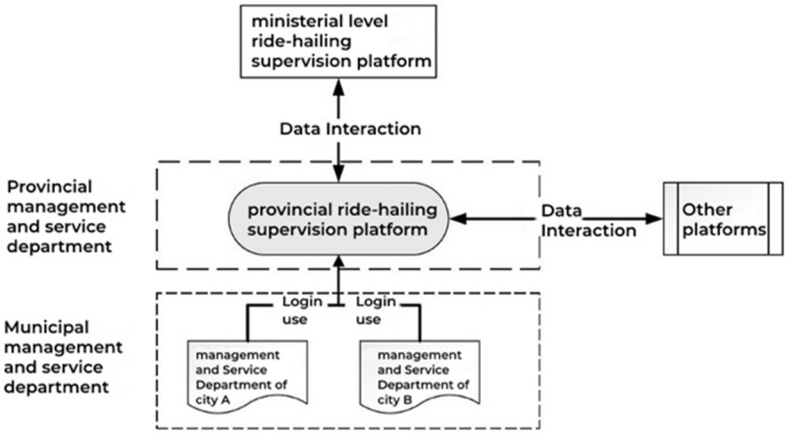

Figure 1 Overall structure

3.2 Business architecture

The data sources of online car-hailing mainly include ministerial level online car-hailing supervision platform, data shared by other business systems, license application and approval system, etc. The provincial online car-hailing supervision platform can receive data through the data exchange interface provided by the ministerial level online car-hailing supervision platform and implement industry management for the online car-hailing industry in the province. The business architecture is shown in Figure 2.

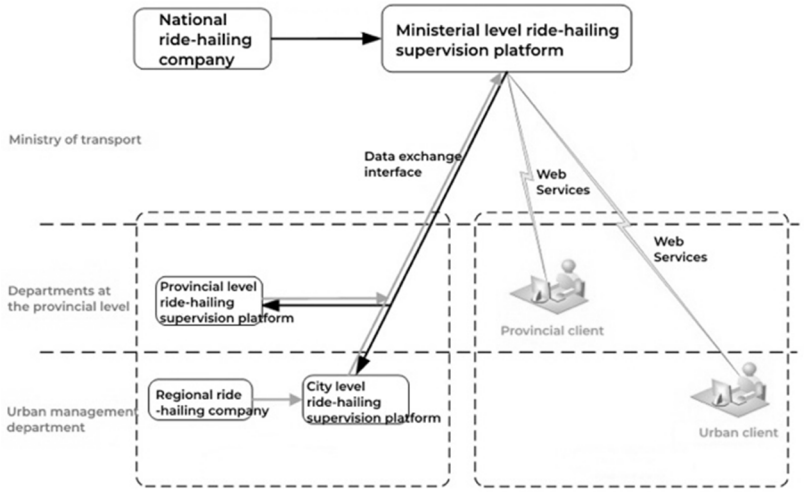

Figure 2 Business architecture

3.3 Logical architecture

The logical framework of the provincial online car-hailing supervision information interaction platform is divided into seven levels and three sets of guaranteed systems. The seven layers from bottom to top are data access layer, network communication layer, infrastructure layer, data resource layer, application support layer, application system layer and information display layer; The three guarantee systems refer to the security guarantee system, standard specification system and operation guarantee system of the information system. The logical structure is shown in Figure 3.

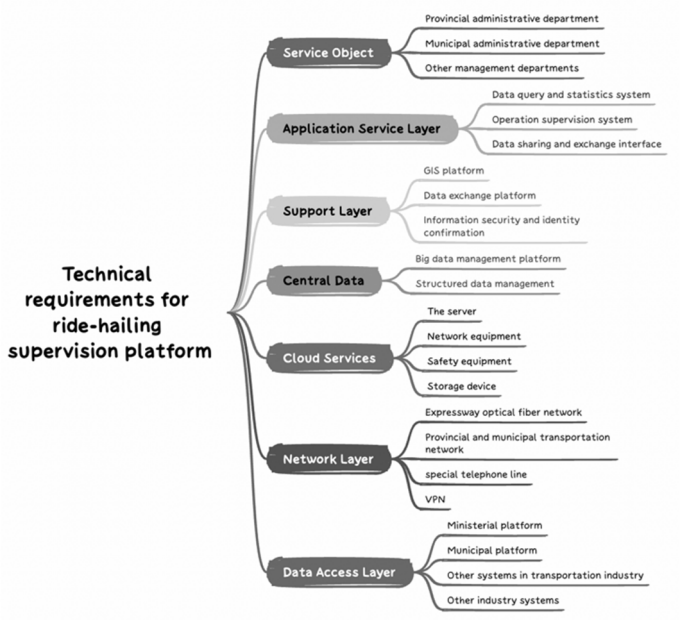

Figure 3 Logical structure

3.4 Technical architecture

Analyze the provincial online car-hailing supervision information interaction platform layer by layer from bottom to top, including data interface layer, file storage layer, data storage layer, data analysis layer, data layer, business control layer, presentation layer and system monitoring layer. The technical architecture is shown in Figure 4.

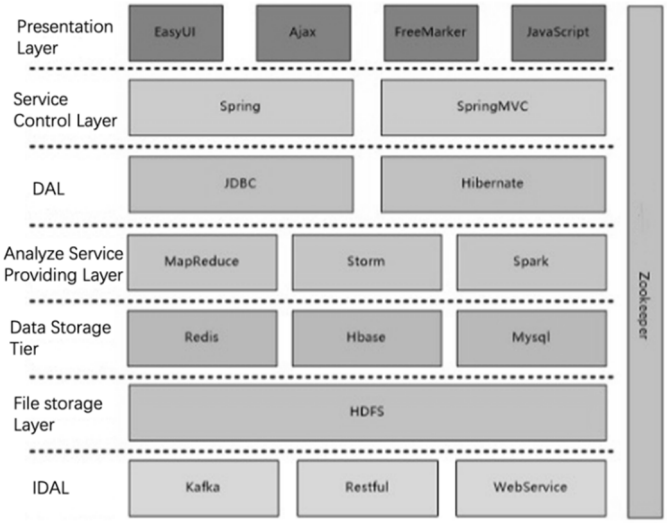

Figure 4 Technical architecture

4 CONCLUSION

According to the requirements of the Ministry of transport, comprehensively considering the industry characteristics of online car-hailing, and based on the existing mature products and technologies, accelerate the construction of provincial online car-hailing supervision platform, to realize the information sharing with the superior online car-hailing supervision platform and the supervision and management of online car-hailing platform enterprises. Take the provincial online car-hailing supervision information interaction platform as the center, conduct data docking with the ministerial level online car-hailing supervision platform, and receive the full amount of data of the online car-hailing platform company issued by the ministerial level online car-hailing supervision platform; Data exchange with other business systems in the province, such as transportation administration system, to obtain license data in the province; Through the interaction of data between systems, it provides the overall supervision and analysis ability for the online car-hailing operation of the province, and provides policy support and decision-making basis for the competent government departments.

REFERENCES

[1] General technical requirements of online taxi reservation supervision information interaction platform. Policy document of the Ministry of transport. 2016.

[2] Measures for the operation and management of online taxi reservation supervision information interaction platform. Policy document of the Ministry of transport. 2018.

[3] WANG Junjie, DONG Zhenning. A Review of the Development of Online Online car-hailing in China [J]. China Transportation Review, 2022, 44(03):15-23.

[4] ZHANG Maoyuan, LIAO An. Research on Internet platform supervision from the perspective of Technology[J]. administrative tribune, 2021, 28(06): 114-121.
[5] WEN Jing. Research on supervision problems and Countermeasures of online booking taxi industry in Guangxi [J]. Western China Communications Science& Technology, 2021(10):176-178.
[6] Wang Renhe， Li Zhaochen， Han Tianming， Chen Ling. The Agile Regulatory Model of Platform Economics ——A Case Study of Online Car-Booking Industry [J]. Forum on Science and Technology in China, 2020(10):84-92.
[7] FENG Ye, WANG Yong. Reform direction of online car-hailing Supervision: implementation of dual supervision system [J]. Public Management, 2020(02): 139-145.
[8] ZHAO Daozhi, YANG Jie. Research on the regulation strategy of online car-hailing considering different regulation targets[J]. Systems Engineering—Theory& Practice, 2019,39(10):2523-2534.
[9] ZHUO Yue, WANG Yu-xi. Risk and Supervision of Online Online car-hailing from the Perspective of Platform Economy[J]. REFORM,2019(09):83-92.