

Research on Water Supply Big Data Framework Based on Wisdom Water

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Abstract— This article mainly studies the overall framework design of the “Wisdom Water” centralized management and control platform. The framework of the “Wisdom Water” overall system includes multiple subsystems such as Dispatch management system, Equipment management system, Meter management system, GIS platform, Data Collection System and Water marketing system. Collaborate with each other. The data communication between the subsystems through the designated service reaches the data sharing mode.

Index Terms—“Wisdom Water”; Data Collection System; Equipment management system; Meter management system

I. INTRODUCTION

The main design idea of the “Smart Water” centralized control platform is the design idea of centralized management of each subsystem. First, for each subsystem, each subsystem is more focused on its own business, from data collection and data processing. After the data statistics finally arrive at the data analysis, each subsystem completes the process of its own business data, and achieves a completed processing degree. Finally, it is centralized into a database through a specified computing and analysis service to provide centralized management and control. The platform performs data presentation. The centralized control platform reads the data analysis and statistics of each subsystem in real time through the WEB service, which can provide a complete data reference for managers and decision makers. At the same time, for the centralized control platform, not only the statistical data is read, but also the real-time monitoring of the operation status of the water supply pipe network and equipment, as well as the staff's duty shift status, from real-time to statistics, can provide the centralized control platform. The most timely decision information^[1].

The “Wisdom Water” centralized control platform is designed for users and roles. It is common to all subsystems. It provides centralized management for users and provides super-privilege for user assignment. Users can log in to each subsystem according to their own role permissions, and have single-point login. The design protects the user's login information, and each system records the user's operation log information. The centralized management platform provides the most convenient and intuitive operation for users by

simultaneously organizing the organization information of the entire business platform in the form of an organization tree.

II. MAIN SUBSYSTEM ARCHITECTURE

2.1 Equipment Management System

The Equipment Management System is mainly used to manage all the equipment information in “Smart Water”, including: equipment basic information, equipment operation status, equipment inventory management, equipment work order and other related equipment operations. For the entire centralized control platform, the management of the equipment is very important, especially the operation state of the equipment. In the water production, the normal operation of the equipment is an important part of ensuring the water supply, then the real-time operation status of the equipment is needed. For acquisition, the device data is collected in real time through the network GPS^[4]. The system sets the monitoring parameters. The device with abnormal data needs to be alarmed in real time. After the alarm, the processing order must be immediately formulated and assigned to the designated work order handler for processing. Therefore, the device response is handled with the fastest response speed, and the operating state of the device is restored as soon as possible. At the same time, for the inventory processing of the equipment, it is necessary to ensure the normal supply of the equipment, and at the same time, provide the manager with the inbound and outbound parameters of the equipment, and can formulate the procurement plan of various equipments in different periods to ensure the normal supply state of the whole production operation^[5].

2.2 Dispatch Command Management System

The dispatching order management system is a highly centralized management dispatching platform. The dispatcher needs to monitor the operating parameters of water production in each area in real time, including equipment status, water quality and quantity. For the abnormal data information produced, the system will alarm, and the dispatcher will After the alarm is detected, the processing response must be made immediately. According to the abnormal category and the place of occurrence, the dispatcher immediately creates a dispatching instruction through the dispatching instruction management system and sends it to the processing personnel, and sets a response time limit. After receiving the instructions, the processing personnel must rush to the processing location for effective processing according to the dispatcher's request. After the processing is completed, relevant text and picture information must be provided as feedback to the dispatcher, and the dispatcher performs scheduling and archiving after actual review^[2]. For the whole process, the most critical part is the mastery of timeliness. For abnormal alarms, the loss must be reduced, and the scheduling is handled in the shortest time. This is the core of the entire

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dispatching command system. For related auxiliary functions, the system performs data mining analysis based on past abnormal data, provides an effective scheduling plan and abnormal prediction, and can better provide scheduling accuracy.

2.3 Data Collection System

The data acquisition system is the data core of the entire centralized control platform. The data collection for all kinds of devices is supported by the data acquisition system. The above mentioned monitoring device abnormal information, etc., all need real-time acquisition of the data acquisition system to achieve, then Data collection needs to be equipped with powerful big data processing to complete. First of all, the real-time data collection needs to be completed by the server-to-device peer-to-peer communication, maintaining a long-term heartbeat connection, observing the online state of the device at all times, and obtaining the relevant operational data of the device through effective instruction transmission, by specifying the parsing method. Analyze the operational data of the device. The data acquisition system has three key processes: timeliness, concurrency, and massive data. If these three points are solved, the entire data acquisition system can realize its function^[3].

III. DATA PROCESSING SERVICE

Data processing service is a data service architecture in which various subsystems are connected in series. The services of each subsystem are relatively independent, but there are data associations and data dependencies in individual aspects, so each subsystem needs to pass certain data interaction. The service performs efficient data transfer to complete the final business operation. The data processing service system is processing and calling. First, the data processing is completed according to the services of each subsystem, and the data generated by the daily system business is saved and calculated. For the data that needs to be provided by other subsystems, it is required. After the specified processing is completed, it is provided to other subsystems through the webservice interface^[6]. Other subsystems can write the interface through the relevant calling mode and principle of the webservice when needed, and extract the data, thus completing the data transmission. Another data calling method requires the data service to actively push. When the A system processes the data, it is actively pushed to the corresponding receiving service class of the data processing service. After receiving the data, the service class judges according to the transmitted parameters and confirms. The B system that receives the data, and then actively connects to the B system, saves the data to the database of the B system or the designated receiving class of the B system, and also completes the data transmission operation.

IV. COMPREHENSIVE ANALYSIS

The function realized by the centralized management and control platform is to manage the personnel, authority and role of each subsystem, and to manage the operation status and parameters of each subsystem. The other main function is comprehensive analysis, which makes the data of the entire platform effective. The operational analysis is provided to the manager, which is the ultimate goal of the centralized management platform. The comprehensive analysis is to summarize the data of each subsystem, and calculate the

results according to various events and various results. The essence of comprehensive analysis is to make data prediction. The data is sorted and sorted by means of data mining. The sorted data can be used as the prediction probability of one or more events. For the whole process of water production, there may be alarms. There are so many exceptions, then a reasonable data foundation is needed to make predictions, helping managers to discover and deal with the anomalies that occur, thus effectively reducing losses. The centralized control platform may effectively display various types of data and extract the most important parts for key warnings. This operation ensures the clearest and most conspicuous operation. On the other hand, the centralized management platform provides a unified login portal. Users do not need to remember the login addresses of multiple systems, and can log in directly through the management platform. However, the pre-super administrator has set up very clear login permissions for all types of personnel. This ensures that the management of each individual is clear and clear, there will be no leapfrog or missing parts, and the management is highly consistent.

V. CONCLUSION

Through the comprehensive analysis of the entire smart water centralized management and control platform business, through the analysis and understanding of the SOA architecture, we divide each subsystem according to its functional structure, ensure the business focus of the subsystem, and develop multiple service systems to ensure data. The effective flow of the flow, the various subsystems are docked together, and the software design idea of high cohesion and low coupling is realized. Thus, for the administrator, the centralized management platform can not only realize the effective management of various businesses, but also provide authority. Decision analysis and judgment, reaching the ultimate goal of centralized management and development platform design and design.

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