



Research on the Application of Computer Technology in Automatic Operation and Maintenance of Enterprise Information System

Liang Chen^(✉), Siyu Lu, Yunrui He, Xiangyi Zhang, and Shuo Bai

State Grid Information & Telecommunication Branch, Beijing 100761, China
hzhongdian1@163.com

Abstract. The fierce competition in the market has also put forward higher requirements for the development of enterprises, and there is an urgent need to automate operations and maintenance. Computer systems, as the core components of enterprise information systems, play an important role and value in the automation of enterprise operation and maintenance. The use of computer technology in enterprise information systems can greatly release the work intensity and pressure of operation and maintenance personnel, and better ensure the efficient operation of the system. Based on this, this paper briefly explains the current situation of operation and maintenance in the information technology industry at home and abroad, studies the concept of automated operation and maintenance of enterprise information systems, then studies the design and implementation of automated operation and maintenance systems for enterprises, and finally gives the specific use of computer technology in automated operation and maintenance, so that the role of automated operation and maintenance tools can be brought into play and better play a positive role in the automated operation of enterprise information systems. The role of automated operation and maintenance tools is brought into play to better play a positive role in the automation of enterprise information systems, to promote the development of enterprises and the effective enhancement of economic benefits, and ultimately to help the development of China's market economy.

Keywords: Computer Tech · Automatic Operation & Maintenance · Enterprise Info System · Automation · Operations and Maintenance · Informatization

1 Introduction

Along with the continuous promotion of enterprise information construction, business development and information technology integration more closely, the new business system on the infrastructure equipment and network stability requirements continue to improve [1]. At present, some of China's operations are still in the manual stage, mainly reflected in the manual way to implement various types of deployment, and through

the manual way to complete the release and operation and maintenance operations, the overall degree of automation is not high, the data analysis ability and operation and maintenance work planning and standardization are not outstanding, in such a background, people need to enterprise information systems related to In this context, there is a need for research into automated operation and maintenance tools for enterprise information systems to better improve the overall operational efficiency and effectively support the development of the enterprise [2]. Therefore, there is a need to carry out research and application of information system automated operation and maintenance tools to solidify the operation and maintenance management process, reduce duplication of efforts and improve efficiency and standardisation. The utilization of computer tech in the automatic operation & maintenance of enterprise info system can realize the effective integration of many functional modules as shown in Fig. 1 below, realize the centralized management and display of enterprise operation & maintenance business, and provide an important guarantee for the automatic operation & maintenance of enterprises [3]. Enterprise info system can effectively eliminate the info communication barriers between functional departments within the enterprise, realize flexible, lightweight and convenient data sharing, and realize business utilization and value creation by supporting the rapid construction and stable operation of front-end micro utilizations. Through the cross empowerment of technological innovation and management change, complete customer-centered, realize automation and rapid iteration and innovation, and realize the amelioration of core business capabilities and resource aggregation [4]. Therefore, the research on the utilization of computer tech in the automatic operation & maintenance of enterprise info system has important practical value.

In recent years, the state has issued a number of policies to encourage the development and innovation of industrial automation control industry. For example, the “Industrial Internet Innovation and Development Action Plan (2021–2023)”, “Guidelines on Accelerating the Cultivation and Development of High-quality Manufacturing Enterprises” and other industrial policies have provided a clear and good policy environment for the development of China’s industrial automation industry, and also provided a good

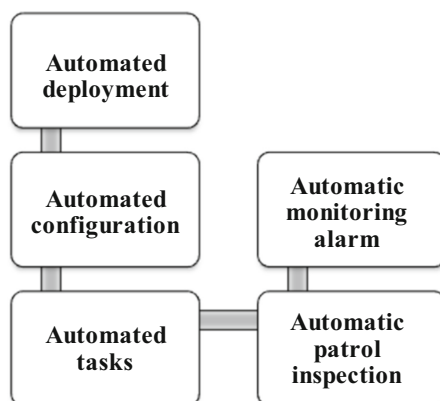


Fig. 1. Basic function modules of automatic operation & maintenance system

production and operation environment for enterprises. In addition, according to the website of the National Bureau of Statistics, from 2019 to 2021, even after the COVID-19 epidemic, the total profits of Chinese industrial enterprises above designated size still increased. In 2019, the total profit of industrial enterprises above designated size in China was 619955 billion; in 2021, the total profit of industrial enterprises above designated size was 870921 billion; by January to June 2022, the total profit of industrial enterprises above designated size was 42702.22 billion, up 1.0% (calculated by comparable caliber). This provides a good economic environment for the development of China’s industrial automation industry.

As shown in Fig. 2, on the whole, China’s industrial automation industry market is in a stage of rapid development. However, due to the late start of China’s industrial automation industry, there is a large gap between the product reliability and foreign enterprises in the early stage. After years of development, although some excellent domestic manufacturers of automation technology level, make our country industrial automation level and foreign brands gradually narrowed, but compared with the United States, Germany, Japan and other industrial developed countries, China’s industrial automation industry foundation is relatively weak, so domestic manufacturers in the field of high-end automation products is also difficult to compete with the international famous manufacturers, it provides the downstream customers with the whole process of research and development, design, manufacturing and service ability also needs to improve. In the long run, the three major factors of industrial upgrading, people’s livelihood demands and energy conservation and environmental protection will create more development opportunities for the development of China’s industrial automatic industry.

As shown in Fig. 3, it can be seen that “Internet + intelligent manufacturing” will accelerate the growth of the market size of our industrial automation industry. In the next few years, with the rapid development of emerging applications such as industrial cloud and robot related to the Internet and collaborative manufacturing, it will effectively drive the overall industrial automation market.

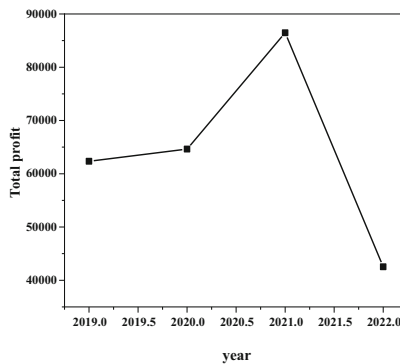


Fig. 2. Changes in the total profits of H1 industrial enterprises above designated size in 2019–2022

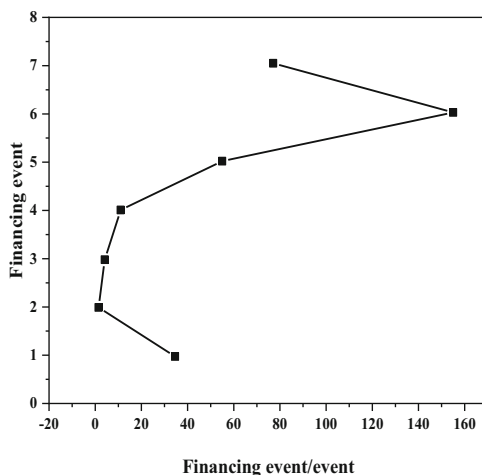


Fig. 3. Investment and financing events in China's industrial automation Industry from January to July in 2022 (unit: from)

2 Current Situation of Automatic Operation & Maintenance of Enterprise Info System

2.1 Positioning of Enterprise Info System Automation Operation & Maintenance System

In order to effectively deal with the challenges faced by the automatic operation & maintenance of enterprise info system, the design of the whole system needs to be carried out based on the principles of process, standardization, integration and intelligence [5, 6]. Secondly, the positioning of the automatic operation & maintenance system of enterprise info system should be based on the suitability of the enterprise, refine the real needs of the enterprise, and use the full sentence thinking to carry out the construction of the whole system. In addition, the design of operation & maintenance system is carried out by means of value orientation, platform support, transparent service and data drive. The governance scope of enterprise info system automation operation & maintenance system includes asset system, configuration management system, process management system, monitoring system and log system. Among them, the asset system weakens the independent change operation, automatically calibrates data, provides various APIs for upper layer service calls, and is deeply integrated with PXE. The framework for enterprise information management is shown in the Fig. 4.

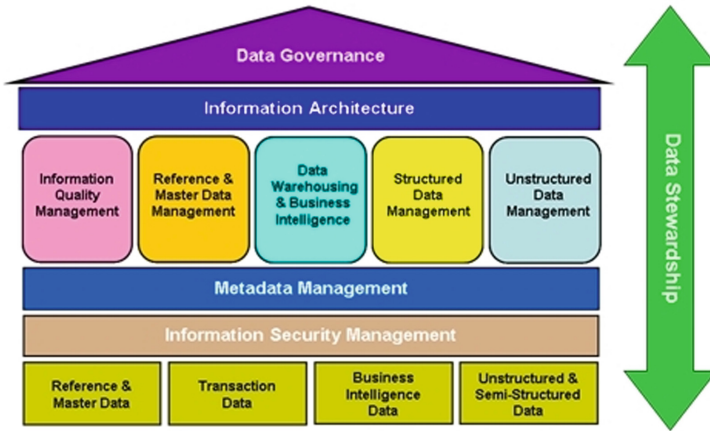


Fig. 4. Framework for Enterprise Information Management

3 Construction of Automatic Operation & Maintenance System Based on Computer Tech

3.1 Construction Principle of Automatic Operation & Maintenance System

The automatic operation & maintenance process of enterprise info system is inseparable from the support of automation control theory, including positive and negative feedback control. The enterprise automation operation & maintenance control system can be divided into different types according to the control mode, component type, system function, performance and reference variation law. Among them, the principle of linear continuous control system is shown in Eq. 1 below, and linear time-varying system, linear constant system, etc. are determined by coefficients [7].

$$\begin{aligned}
 & a_0 \frac{d^n}{dt^n} c(t) + a_1 \frac{d^{n-1}}{dt^{n-1}} c(t) + \dots + a_{n-1} \frac{d}{dt} c(t) + a_n c(t) \\
 & = b_0 \frac{d^m}{dt^m} r(t) + b_1 \frac{d^{m-1}}{dt^{m-1}} r(t) + \dots + b_{m-1} \frac{d}{dt} r(t) + b_m r(t)
 \end{aligned} \tag{1}$$

The architecture of the automated operation & maintenance system is shown in Fig. 5. The system can automatically discover and map infrastructure, utilizations and business services, and associate infrastructure and utilization events to affected services. Conduct root cause analysis through the business service model, show the system architecture in a visual and easy to understand way, optimize resources according to the business impact, and promote problem positioning and solution.

3.2 Construction of Enterprise Info System Operation & Maintenance Automation System

The technical structure of enterprise info system operation & maintenance automation system includes infrastructure, agent, service layer, interface and many other aspects.

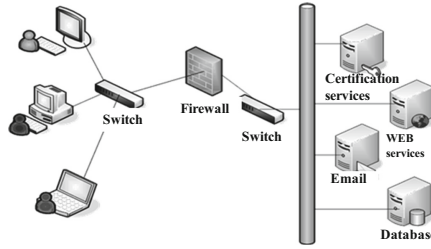


Fig. 5. Construction architecture of enterprise automatic operation & maintenance system



Fig. 6. The framework for process intelligence and improvement

These different levels can ensure the operation efficiency, stability, technical maturity and standardization of the whole system. Among them, the standard development interface can meet the needs of automatic operation & maintenance upgrading and transformation. The infrastructure layer provides physical equipment, cloud platform and other infrastructure. The agent layer includes the agent and SNMP on the operation & maintenance object. The working mode of each functional module of the service layer is the same, and the service interface will be provided, and the results will be saved to the relational database. In addition, at the data architecture level, the recovery and security of operation & maintenance data are guaranteed through data collection, data processing, data storage, data backup and recovery [8–10]. The framework for process intelligence and improvement is shown in Fig. 6.

4 Conclusion

Significant achievements have been made in the application research of computer technology in the automated operation and maintenance of enterprise information systems. Here are some conclusions:

1. Efficiency improvement: Automated operation and maintenance can greatly improve the operation and maintenance efficiency of enterprise information systems using computer technology. Through automated monitoring, diagnosis, and repair functions, the need for manual intervention can be reduced, and the speed of troubleshooting

and repair can be accelerated, thereby reducing the impact of system failures on the business.

2. Problem prediction and prevention: Computer technology can predict and prevent system problems through data analysis and machine learning algorithms in automated operation and maintenance. By analyzing a large amount of historical data, potential fault modes can be identified and corresponding measures can be taken in advance to avoid the occurrence of faults, thereby improving the stability and reliability of the system.

3. Resource optimization: Automated operation and maintenance technology can achieve optimal utilization of enterprise information system resources through dynamic resource scheduling and load balancing. The system can automatically allocate and adjust resource allocation based on real-time load conditions, ensuring system performance and scalability.

Overall, the application research of computer technology in the automated operation and maintenance of enterprise information systems provides efficient, reliable, and secure operation and maintenance guarantees for enterprises. Through automated monitoring, diagnosis, repair, and resource optimization functions, it is possible to reduce operation and maintenance costs, improve system stability and reliability, and provide data support for decision-making. These achievements provide important support for the continuous operation and development of enterprise information systems.

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