

Discussion on the integrated development of industrial Internet and low code development platform

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Abstract

low code development platform refers to the development platform that can quickly build various application systems through visualization without or a small amount of code. Based on the development reality of the current low code development platform, it can promote the integrated development of low code development platform and industrial Internet, and speed up the construction of industrial Internet. Therefore, based on the development of low code development platform, this paper focuses on the development opportunities and existing problems of industrial Internet and low code development platform, and puts forward the role of Middleware in the integration and development of the two, hoping to provide effective reference for accelerating the construction of industrial Internet.

Keywords

Industrial Internet; Low code development platform.

1. Introduction

Low code technology will break through the barriers of information technology and operation technology. With the help of the basic computing model and industry mechanism model built in the low code development platform, developers can complete most common functions in customized development projects without coding. The industrial mechanism model in the low code platform can be rapidly developed, tested, deployed, verified and iterated, so as to realize the integration of industrial application development, operation and maintenance. Therefore, studying the related problems of low code development platform can effectively promote the construction of industrial Internet and promote the integrated development of industrial Internet and low code development platform.

2. The main opportunity for the integrated development of industrial Internet and low code development platform

(1) Promotion of the development trend of industrial Internet

Since 2018, the multi-level policy of industrial Internet has been issued, the industrial development has accelerated, and the market scale has increased explosively. With the development of informatization, under the new infrastructure construction, the digital transformation of industrial enterprises has pressed the "fast forward key". However, due to the high cost of traditional software development mode, the development speed can not catch up with the demand speed, poor flexibility, weak agility and many other practical problems, there are many obstacles in the transformation of enterprises and the voice of "three difficulties": first, the transformation ability is not enough and will not change; Second, the cost of transformation is too high to be transferred; Third, the transformation pain period is long and dare not turn.

For small and medium-sized industrial enterprises with weak digital foundation, lack of knowledge and technology, it is not enough to improve technology alone. More importantly, it is the ability to sort out industrial scenes and business processes. Only technology is difficult to implement, only business scenarios without technical support are difficult to realize process innovation. The development of industrial app needs to be based on a large number of operating technical knowledge. Low code technology enables operating technicians to deeply participate in software development engineering with its characteristics of low threshold, high efficiency and easy integration. "Low code and instrumentalization" may be the "driving force" to promote the long-term development of industrial Internet.

(2) The rise and development of low code development platform

The low code development platform can be traced back to the programming languages and tools from the 1990s to the early 21st century. Similar to the previous development environment, the early low code development platform is based on model driven, and later gradually evolved into data-driven, and created the principle of automatic code generation and visual programming. With the continuous maturity and development of the low code development platform, the low code development platform gradually has the development ability of general scenes, such as websites, games, 3D scenes, e-commerce, enterprise applications and personal applications. The supported systems will also be more comprehensive, such as webapp, IOS / Android, windows / MAC / Linux, applets and other applications. In addition, the large demand for low code development platforms in the market also promotes the continuous efforts of low code development platforms to improve their versatility and convenience.

3. 2.Problems in the integrated development of industrial Internet and low code development platform

(1) Industrial Hardware lacks flexibility and scalability, which is difficult to combine with low code development platform

At present, most of the commercial low code development platforms in the industry are still for the development of mobile terminal and web page applications, the rapid construction of scene applications, and the development of BPM platform for business process management within the enterprise. The business requirements are described in a graphical and visual drag and drop mode to form a visual business logic design. Due to the lack of "universal application platforms" and the lack of "universal application development and management", it is particularly difficult to build a large number of new types of applications for the Internet of things, which is due to the lack of "universal application development and management" in the current stage, because there are not many new types of applications, and the number of new application development and maintenance is not flexible, However, many low code development platforms have a single front-end interface, and encounter terminals with different IOT application development and server application development environments, so they cannot carry out effective deployment, operation and maintenance.

(2) The modules of low code development platform are not rich enough, and the process of new business development is cumbersome

At present, the existing low code development platforms in China have specific customer groups, which can meet the basic business needs, but the application is solidified after deployment and cannot be modified conveniently. After the deployment of traditional side and end device applications, any functional modification needs to follow the complete version development process, and there is no convenient side cloud collaborative development and deployment mechanism. For technicians who have used many low code development platforms,

the operation of the low code development platform is simple, only for the encapsulated methods and businesses. Once a new business is launched, the development and debugging will be extremely cumbersome, which is not suitable for innovative enterprises with frequent business changes and large enterprises with complex business systems.

4. Strategy of using middleware to promote the integrated development of industrial Internet and low code platform

(1) Use the development of middleware to solve the problem of inconsistent interfaces in different environments

Most popular middleware services use proprietary APIs and proprietary protocols, which makes it difficult for applications to interoperate with products from different manufacturers. Some middleware services only provide the implementation of some platforms, which limits the transplantation of applications between heterogeneous systems. At the same time, many devices do not provide software development kits, In this case, the front-end programming interface of low code platform can not be realized directly. Study the general middleware suitable for the front-end programming interface of low code platform, support the transparent conversion of heterogeneous system data format, facilitate system expansion, and enable heterogeneous devices to access the platform quickly.

(2) The concept of cloud choreographed app development platform is adopted to provide different hardware platforms to adapt the running engine

The cloud choreographed IOT app development platform developed by Huawei can realize the rapid development of IOT app and massive side-to-side application management through cloud visual choreography and development, side-to-side remote automatic deployment, and cloud side collaborative management and operation and maintenance. This platform includes two parts: the development platform in the cloud and the operation engine in the side. The operation engine can run in the server, side equipment and end MCU in the cloud. It is responsible for interpreting and executing the process metadata distributed by the cloud platform. The process execution process can interact with the processes in the external system or other engines, Complete the business functions of a specific app. By adapting the running engine for different hardware platforms, the industrial Internet can be effectively deployed, operated and maintained.

5. Conclusion

As one of the main choices for enterprises to build industrial Internet, the integrated development of industrial Internet and low code development platform plays an important role in accelerating the construction of Internet. However, from the current development status of low code platform, there are still problems in the non-uniform interface between industrial intelligent equipment and low code platform, which affects the progress of the integrated development of industrial Internet and low code platform to a certain extent. Therefore, strengthening the research of low code platform can effectively promote the construction of industrial Internet and improve the efficiency of industrial development.

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References

- [1] Haghnegahdar L , Joshi S S , Dahotre N B . From IoT-based cloud manufacturing approach to intelligent additive manufacturing: industrial Internet of Things—an overview[J]. *The International Journal of Advanced Manufacturing Technology*, 2022, 119(3-4):1461-1478.
- [2] Yan Z . The Impacts of Low/No-Code Development on Digital Transformation and Software Development[J]. *arXiv e-prints*, 2021.
- [3] Prinz N , Rentrop C , Huber M . Low-Code Development Platforms – A Literature Review[C]// *AMCIS 2021 Proceedings*. 2021.
- [4] Poursoltani Y , Shirali-Shahreza M H , Ahg S . Using Low-Code Development Platforms for developing Commercial Software based on Business Processes[C]// *26th International Computer Conference, Computer Society of Iran Tehran, Iran - 3-4 March 2021*. 2021.
- [5] Bian L , Zhang J , Cui Q , et al. Research on the Realization and Application of Intelligent IoT Platform for Electrical Equipment under Industrial Internet[J]. *Journal of Physics: Conference Series*, 2021, 1982(1):012078 (12pp).
- [6] D Benítez. Software-Defined Networking Solutions, Architecture and Controllers for the Industrial Internet of Things: A Review[J]. *Sensors*, 2021, 21.
- [7] Serror M , Hack S , Henze M , et al. Challenges and Opportunities in Securing the Industrial Internet of Things[J]. *arXiv e-prints*, 2021.
- [8] Levitt M , Norton R J , Hill B W . Low-Code Development Platform:, US20210255842A1[P]. 2021.