Research on Accelerating Application Technology of Centralized ERP System Based on HANA

Haohai Zhang¹, Wei Wang¹, Xinqiao Gu¹, Hao Wang¹, Wei Zhang¹, Jianling Bian¹

¹Beijing Zhongdianpuhua Information Technology Co.Ltd
zhanghaohai@sgitg.sgcc.com.cn

Abstract: In order to effectively improve the processing speed of centralized deployment in enterprises, this paper proposes a research based on HANA to accelerate the application technology of centralized deployment of ERP system. By optimizing the configuration of data processor unit in ERP physical deployment module, the running efficiency of the system is accelerated. The optimized data processor is used to calculate the parameter index of centralized deployment acceleration authority. According to the parameter index, the deployment role framework of each department of the enterprise is reasonably allocated, so as to reduce the centralized deployment operation time, achieve the goal of accelerating the system operation, and finally realize the effective application of the centralized deployment ERP system acceleration technology. Finally, through comparative experimental tests, it is confirmed that the actual application effect of the HANA - based accelerated application technology for centralized deployment of ERP system can reach more than 90 %, which is significantly improved compared with the traditional centralized deployment accelerated technology.

1. INTRODUCTION
With the continuous improvement and development of current ERP product architecture and functions, the new generation of HANA S / 4 HANA has effectively completed the design goal of improving the functions and performance of centralized ERP system deployment[1]. The authority system for centralized deployment of ERP system based on HANA has been expanded and connected, which effectively makes it possible to improve the effectiveness of modern advanced technologies such as the Internet of Things and artificial intelligence. In order to further optimize the system and achieve the research goal of accelerating the application technology, a centralized deployment ERP system upgrade and acceleration research based on HANA was carried out. In order to further ensure the accuracy of the system operation, a verification module for centralized deployment ERP system was set up, and the accuracy comparison score was processed in combination with the system weight, so as to achieve the research goal of expanding the application business. Through the comparison and verification of current ERP system, the financial management and material management of the system are speeded up.

2. ACCELERATED APPLICATION TECHNOLOGY FOR CENTRALIZED DEPLOYMENT OF ERP SYSTEM BASED ON HANA
Optimizing the centralized deployment of ERP system is conducive to standardizing the efficient business management within the enterprise, thus effectively improving the comprehensive
management level of the enterprise. As the current ERP system usually deploys enterprise management in a decentralized manner, problems such as serious differentiation and non-standard management information arise\(^2\). In order to solve the above problems, this paper puts forward the research based on HANA on accelerating the application technology of centralized deployment of ERP system, so as to achieve the research goal of promoting the management of each enterprise, standardizing the business process and achieving the consistency of centralized deployment, so as to effectively improve the level of comprehensive management of the core business of the enterprise. Optimizing and accelerating the centralized deployment of ERP system can greatly save the construction investment in enterprise management. In order to optimize and accelerate the system effectively, the hardware and software resources of the system are first planned and configured.

2.1 Optimization of ERP Physical Centralized Deployment Module Based on HANA

In order to speed up the ERP system for centralized deployment and optimize the configuration of the physical centralized deployment module, in order to ensure the effectiveness and accuracy of centralized deployment, the information collector, information storage and other units in the physical centralized deployment module are optimized and screened in combination with HANA technology, and the internal data device of the system is screened in order to effectively screen and screen useless information after processing information such as enterprise economic management and department management, and accurately retain and store effective information. In order to improve the acceleration of centralized ERP physical centralized deployment module\(^3\). Unified from the perspective of the whole company, according to the characteristics of module application, appropriate and reasonable business function subdivision settings will be made to form a unified common role. Local roles are created by common roles plus restrictions on the corresponding company code and permission values.

Figure 1 Centralized Deployment of ERP System Data Processors

In order to effectively manage and scientifically deploy the enterprise, an information receiving module is added to the centralized ERP system information processor, which can effectively output multiple management information of the enterprise, share the internal resources of the centralized physical deployment module in a larger scope, and improve the work efficiency of the centralized physical deployment module, thus effectively achieving the research goal of classifying and accelerating the system. Since HANA - based accelerated application technology for centralized ERP system needs to ensure the security and stability of the system operation in the actual operation process, it is necessary to optimize the system physical module structure in order to improve the system operation effect and ensure the system operation. Combining the above methods to optimize and improve the physical centralized deployment module configuration can effectively improve the operation effect and safety of the system, ensure the centralized deployment effect of enterprises on financial management, human resources management, resource management and other aspects, accelerate the efficiency of centralized deployment, and improve the scientificity and accuracy of
deployment. In order to further complete the accelerated application of centralized deployment of ERP system, it is necessary to further obtain the standard deployment weights in HANA database and compare them according to the deployment weights to complete the design requirements for optimizing the scoring effect of centralized deployment.

2.2 Deployment Allocation Algorithm Based on HANA Database
In order to further calculate the standard deployment parameters in the database, so as to improve the accuracy and efficiency of centralized deployment decision-making through calculation as a basis, evaluate the effectiveness of enterprise management, and calculate the deployment parameters of HANA database, fully measure the complexity, workload and operation and maintenance cost of authority deployment from the aspects of coding specification, role number, local role generation strategy, role hierarchy, customization development, expansion flexibility, security, and integration with the unified platform, and strictly control the authority from the system, process and technical means [5]. First, we need to calculate the availability indicator A for centralized deployment:

\[ a = \frac{\text{TET} - \text{SIT}}{\text{TET}} \times 100\% \]  

Where TET is the total elapsed time and SIT is the sum of non-working time; OT is the centralized deployment operation time; DT is downtime. Combined with the above algorithm, the accelerated authority parameter index can be effectively obtained to obtain the following information

| Indicator description | Availability index (%) | Downtime (H) | Indicator score |
|-----------------------|------------------------|--------------|----------------|
| Basic parameter indexA | 98.4                   | 68.04        | 0.04           |
| Efficient parameter indexQ | 89.0              | 61.85        | 0.12           |
| Failure parameter indexW | 45.4               | 42.40        | 0.03           |
| Complex parameter indexE | 89.9             | 71.51        | 0.41           |
| Maximum parameter indexG | 91.5              | 68.74        | 0.36           |
| Fault tolerance parameter indexH | 93.8        | 71.04        | 0.28           |
| Disaster tolerance parameter indexS | 92.3 | 59.48 | 0.29 |

Combined with the information in the table, reasonable permission configuration is adopted to strictly control system users' compliance and safe access to system permission data. The fuzzy evaluation parameters of HANA database are obtained for evaluation and calculation. If L is the
system operation effect, R is the enterprise management information flow, and K is the feedback parameter, then the system operation evaluation parameters are:

\[ \delta = k \sum_{i=1}^{l} HQ_i - \log W_i \left( \frac{l}{AE_i} + \frac{r}{G_i S} \right) \]  

(2)

According to the specific scores of each unit's analysis points, the quantitative V calculation is carried out. If the difference of a certain type of application in each unit module is, the data deployment allocation parameter algorithm is:

\[ c_n = \delta \sum_{i=0}^{k} a_i V / k^n \]  

(3)

Combined with the above algorithm, based on risk control and following the principles of standardized, scientific and refined design, the design principles include the following points: business activity driving and responsibility separation[6]. System permission design based on business activity requirements, that is, permission requirements depend on employees' roles and activities within the enterprise business process system. Effective data protection. The confidential data in the system must be fully protected, and the information in SAP system must be strictly controlled to ensure the security of data, operation and access. Integrity. The data in the system must be consistent, complete, correct and available[7]. In HANA system, proper authority must be assigned to the required post users, and the division of authority and responsibility correctly reflects the management relationship between the headquarters of State Grid Corporation and the provincial and municipal companies. Control effectiveness. Through reasonable authorization supervision measures and auditing measures, effective control of system authorization can be realized. Control the execution efficiency. Through the pre-set permission management process, the system is managed efficiently. Compliance. The authorization management of the system must conform to the requirements of relevant laws and regulations.

2.3 The centralized deployment of ERP system role assignment speeds up processing

In order to better optimize the centralized deployment of ERP systems, strengthen the scientific management of enterprises, and avoid the waste and loss caused by repeated investment, the authority management system for centralized deployment of ERP systems is designed. First, the evaluation criteria for the differences in the weights of centralized deployment of ERP systems are calculated and compared, so as to effectively check the problems in the centralized deployment process[8]. In the centralized deployment of ERP system weight difference scoring standard can effectively improve the enterprise management level, accelerate the centralized deployment of operation and maintenance service level, and promote the standardized operation of operation and maintenance. After completing the optimization of hardware configuration for centralized deployment of ERP system, in order to speed up the upgrade and promotion of subordinate units and improve and perfect the standardization of enterprise operation and maintenance management, enterprise information is centrally controlled through the development of enterprise information resources. Through a large number of investigations and studies, the data of each module in the centralized deployment system is migrated, and through optimizing the management authority of the undivided and unactivated units, the number of financial vouchers, internal orders and control vouchers can be split up to achieve the research goal of accelerating the centralized deployment effect of enterprises. Considering the clear responsibilities of users' posts and their integration with the unified authority management platform, starting from the job requirements and in order to reflect the management hierarchy, a composite role was enabled in the authority design for centralized deployment of ER system. The composite role usually combines the single roles corresponding to each business function in a similar way, constructs the composite role, and gives the users with the corresponding job authority. The composite role architecture is shown in the figure.
Fig. 2 composite role architecture as shown in the figure

As shown in the figure, in this scheme, the existing HAN centralized deployment business suite product management parameters are upgraded and converted to HANA S / 4 HANA products by calculating the HANA database standard permission parameters with the tool SUM or DMO. In this process, all the work of version upgrade, HANA database conversion and the main work of business data conversion are completed through HANA standard tools, while the other part of business data conversion is completed through consultant running HANA background standard configuration process. The derivation of local roles mainly focuses on the principles of easy generation, easy management, easy control, easy clarity of business operations and easy control of security. All transaction codes and rights objects of derived roles originate from and are consistent with common roles. Changes in transaction code and permission object values can be derived and published to sub-roles, and the corresponding values of sub-roles will not change after the organization structure values are derived and published. Common roles and derived roles are one-to-many relationships. The derived rules of local roles are derived by organization level and other codes promoted to organization level. The features of this scheme are all reserved for primary data, historical transaction data and customer configuration content. In theory, the client namespace object is not touched. Due to the adoption of the minimum downtime option of HANA standard upgrade tool, most upgrade work can be completed during working hours. Technical downtime is mainly affected by the amount of historical business data.

2.4 Centralized deployment of ERP system to accelerate the implementation of application technology
ERP system, as a supporting platform for enterprise management, whether centralized deployment is feasible or not depends on the control level and business standardization of each branch and subsidiary of the group. From the point of view of technology implementation, it depends on the technical support capability such as performance, integration and development. From the point of view of technical value, HANA S / 4 HANA conforms to the information development strategy of the national network "Cloud and Big Things Move" and the construction goal of "One Platform, One System, Multiple Scenarios and Micro Applications" of the 13th Five-Year Information System of the national network. S / 4 HANA can be used as a tool to simplify IT architecture and reduce total cost of ownership. First, data space can be reduced, thereby saving hardware and operating costs. Secondly, S / 4 HANA can be regarded as an open platform to facilitate the adoption of new technologies and applications. In addition, during the installation and use of the system, a wizard-like configuration interface is provided, which can easily configure the system according to the full-text search configuration menu. The HANA database can effectively transform and merge several existing HANA business suite products into the target S / 4 HANA system for centralized deployment. Based on the mapping and conversion of table contents, a set of target S / 4 HANA system needs to be built and configured before running HANA SLO conversion merging. After business and process integration and standardization, it is centrally deployed in an ERP system and can be deployed to the three data centers. S / 4 HANA brings direct benefits to ERP centralized deployment mainly in expanding business functions, improving system performance and improving user experience. HANA centrally deploys accelerated conversion processing steps as shown in the following figure.
As shown in the figure, HANA extends business functionality compared to centrally deployed ERP systems. Some features have been improved, while some features have been added. By improving functionality, business operations are simplified to make your business more visible. New features provide the possibility to integrate other businesses into HANA, such as new vendor lifecycle management capabilities. From the technical value point of view, S/4 HANA conforms to the national network "cloud Big Things Shift" information development strategy, a platform, a system, multi-scene, micro-application construction goals. You can use S/4 HANA as a tool to simplify your IT architecture, reduce total cost of ownership, and reduce data space, resulting in savings in hardware and operational costs. Second, S/4 HANA can be seen as an open platform to facilitate the adoption of new technologies and applications. In addition, during the installation and use phase of the system, a wizard-style configuration interface is provided, which makes it easy to configure the system based on the full-text Search configuration menu. Centralized deployment ERP system reliability requirements include: fully redundant architecture design; stable and reliable hardware equipment; mature software products; fault detection, fault identification and failover capabilities; ERP downtime recovery of no more than 1 h; smooth scaling capability; and code-level, data-level exception handling mechanisms. By using the above algorithm, the acceleration processing of the centralized deployment system can be completed effectively, so that the performance of the centralized deployment system can be significantly improved, and the performance bottleneck problem of the existing system could be solved. In another respect, HANA provides real-time analysis, which in turn improves management and decision-making efficiency. The user experience has been improved. Existing system performance is poor when dealing with some businesses, while interfaces and operations are cumbersome and the user experience needs to be improved. S/4 HANA improves the user experience by improving performance, optimizing interfaces, and more. By simplifying the data model, it can reduce the difficulty of developing the customized function and reduce the pressure of the late operation and maintenance. For the company, through this research project, to develop a group of familiar with S/4 HANA technical personnel, for the expansion of the company in S/4 HANA Business to provide favorable conditions.
3. TEST BED AND MEASUREMENTS

In order to verify the effectiveness of Hana-based accelerated application technology for centralized deployment of ERP system, based on the data results of source system and target system, relevant data testing work was carried out to ensure the quality of historical data migration work. Because the data migration of this scheme is directly modified from the underlying data table, rather than being handled according to the application logic, there may be data missing or data inconsistency caused by inaccurate mapping rules, so the test work is extremely necessary. The test process includes functional test, user acceptance test, integration test and performance test. After defining the test environment and test strategy, complete the overall test of the migration plan to ensure the migration effect of the plan. Compared with the traditional centralized deployment efficiency and the improved centralized deployment efficiency of the enterprise in this paper, the simulation experiment was carried out under the same conditions and the following results were obtained.

Fig. 4 compares the experimental results

It is not difficult to find out from the inspection results above that compared with the operation effect of the traditional centralized untrue system, the accelerated application technology based on HANA for centralized deployment of ERP system can effectively improve the deployment efficiency and complete the research requirements of rapid deployment, and successfully solve the application problems existing in some special business objects. At present, most companies have more complex business objects and need to be adjusted, so they have adjusted the bottom customized information in the implementation process, adjusted the conflicts of the bottom objects analyzed in the previous stage, and adjusted the migration scope of the corresponding business objects according to the changes in business processes, thus effectively completing the accelerated processing of centralized deployment.

4. Conclusions

ERP centralized deployment is an important stage in the process of enterprise construction. Accelerating centralized deployment is not a simple centralized management of system servers, but a technical project to reduce IT costs and optimize the functions of standard template systems for subsidiaries and subsidiaries. ERP centralized deployment is to meet the information requirements of enterprise management change, provide support for business standardization and unification, and improve the control ability of large-scale enterprise headquarters. It is also to share the main data, run through the processes and centrally manage the applications in a wider range of enterprises, so that ERP system can better support enterprise business strategy and management change. The centralized deployment of ERP will be a complex project with large investment, long period, numerous contents and difficult promotion. As an important supporting tool for enterprise management, only by
accelerating the centralized deployment of ERP system, improving system functions and improving application level can the long-term operation of the enterprise be guaranteed.

Acknowledgements
This paper was supported by National Power Grid technology project.

References
[1] Sean O’Flaherty ‡, Mamoru Fujitsuka §, et al. Synthesis, Characterization, and Optical-Limiting Properties of Axially Substituted Gallium(III) Naphthalocyanines[J]. Chemistry of Materials, 2016, 14(12):5163-5168.
[2] Peyvandi F, Mannucci P M, Garagnola I, et al. A Randomized Trial of Factor VIII and Neutralizing Antibodies in Hemophilia A[J]. New England Journal of Medicine, 2016, 374(21):2054-2154.
[3] Yuyama K, Sun H, Usuki S, et al. A potential function for neuronal exosomes: Sequestering intracerebral amyloid-β peptide[J]. Febs Letters, 2016, 589(1):84-88.
[4] Londen S O, Petzeltová H. CONVERGENCE OF SOLUTIONS OF A NONLOCAL PHASE-FIELD SYSTEM[J]. Discrete and Continuous Dynamical Systems - Series S (DCDS-S), 2017, 4(3):653-670.
[5] Jee B, Eisinger K, Gulenoor F, et al. Continuous Wave and Pulsed Electron Spin Resonance Spectroscopy of Paramagnetic Framework Cupric Ions in the Zn(II) Doped Porous Coordination Polymer Cu3−xZnx(btc)2[J]. Journal of Physical Chemistry C, 2016, 114(39):4-9.
[6] Hefferan M P, Kucharova K, Kinjo K, et al. Spinal astrocyte glutamate receptor 1 overexpression after ischemic insult facilitates behavioral signs of spasticity and rigidity[J]. Journal of Neuroscience the Official Journal of the Society for Neuroscience, 2016, 27(42):11179-91.
[7] Suk K T, Yoon J, Kim M Y, et al. Transplantation with autologous bone marrow-derived mesenchymal stem cells for alcoholic cirrhosis: Phase 2 trial[J]. Hepatology, 2016, 64(6):2185.
[8] Heimberg G, Bhatnagar R, Elsamad H, et al. Low-dimensionality in gene expression data enables the accurate extraction of transcriptional programs from shallow sequencing[J]. Cell Syst, 2016, 2(4):239-250.
[9] Mario M, Tomislav M, Mihaela P, et al. Modulating Composition and Metabolic Activity of the Gut Microbiota in IBD Patients:[J]. International Journal of Molecular Sciences, 2016, 17(4):578-601.