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Feasibility Study on Migration of Domestic Database System for Grid Marketing Service System

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Abstract

With the methodical advancement of the Energy Internet Marketing Service System across each network province in accordance with the blueprint, the company's marketing business development has ushered into the digital era, thereby necessitating elevated benchmarks for the system's security, reliability, cost-effectiveness, agility, and operational efficiency. Through an exhaustive scrutiny encompassing marketing business dynamics, technical architecture intricacies, and system operational modalities, the imperative arises for the replacement of the Oracle database and the advocacy for a feasibility study exploring the migration to a localized database system. Within this framework, the grid marketing service system's domestic database migration project confronts myriad challenges and risks. To ensure the seamless implementation of the project, this paper embarks from the vantage point of the project's specific context, amalgamating well-established risk management paradigms and methodologies. Leveraging the trapezoidal fuzzy number and material element topology computational model, potential risk factors are methodically discerned. Subsequently, the project's overall risk landscape is meticulously charted through the lens of this model, culminating in the formulation of targeted risk response strategies and a comprehensive feasibility assessment predicated upon the weighted ranking of risk factors. Ultimately, an array of corresponding risk response measures are delineated, spanning organizational, managerial, scheduling, and technical domains, thereby ensuring the seamless, steadfast, and efficacious implementation of the project, poised to furnish resolute support for its sustained operation post-migration. The research findings of this paper not only provide robust assurance for the feasibility of the migration project concerning the homegrown database system of the grid marketing service system but also offer invaluable theoretical insights and pragmatic wisdom poised to enrich the execution of analogous endeavors.

Keywords: Database migration, risk identification, risk evaluation, risk response, feasibility assessment.

1. Introduction

After three years of meticulous construction, the energy Internet power marketing system, known as Marketing 2.0, has reached a significant milestone by leveraging the microservices architecture on the State Grid cloud platform. This cutting-edge system, which is currently in the process of being gradually extended to cover the entire network province, underscores the critical importance of the "nuclear high base" research task, with its focus on foundational elements such as the database and operating system [1]. Among these foundational components, the database stands out as a linchpin, exerting a direct influence on the efficacy of the IT system in managing data. Despite strides made in technological advancements, China still grapples with bottlenecks and challenges in achieving localization of databases. The imperative to promote database localization extends beyond mere industry localization; it represents a crucial aspect of ensuring both network and national security [1]. In light of the current international landscape, expediting the process of database localization emerges as a paramount priority to safeguard both network integrity and national sovereignty. Against this backdrop, the integration of the Marketing 2.0 system with Oracle database products assumes significant importance [1]. Therefore, a comprehensive examination of migrating the Marketing 2.0 system to a domestic database environment becomes imperative. Such a migration not only signifies a shift towards localization but also underscores the pursuit of core technological autonomy.

This paper endeavors to establish a versatile and adaptable framework for assessing migration risks associated with domestic database systems. By synthesizing a theory of migration risk management tailored specifically for domestic databases and leveraging methodologies such as trapezoidal fuzzy numbers, C-OWA operators, and material element topology theory, the proposed risk assessment method strives to mitigate subjective biases and accommodate the inherent fuzziness of risk factors, thereby offering practical utility in real-world scenarios. Furthermore, this research contributes practical tools for managing risks associated with domestic database migration. It refines a three-step risk identification methodology, encompassing the construction of an indicator base, initial screening of indicators, and confirmation of an indicator system. This methodology not only captures the holistic characteristics and interdependencies of system components but also furnishes a roadmap for similar projects. Moreover, through a feasibility study on the risks associated with domestic database migration within the marketing service system, this paper formulates control strategies and safeguard measures. These insights hold practical significance for stakeholders at various levels, including management, operations, project teams, and frontline workers, by providing actionable guidance for navigating the complexities of database migration projects [2].

2. Risk Identification and Analysis of the Migration of the Home-grown Database System for the Marketing Service System

2.1 Risk identification methodology and process for national database system migration

This paper delves into various methodologies for identifying risks, drawing insights from relevant literature encompassing domestic database system migration risk theory, grid information technology project risk management theory, and related research. Through meticulous literature review and analysis, this study collates a comprehensive array of risk factors associated with the migration of domestic database systems within the grid marketing service system. Subsequently, a risk assessment index system tailored to the migration of domestic database systems within the marketing service system is constructed.

The three-step risk identification method, termed "constructing indicator base - initial screening of indicators - confirmation of indicator system," is devised in accordance with practical considerations. To ensure rigor and reliability, eight experts are enlisted to form an expert group tasked with identifying migration risk factors pertaining to the domestic database system of the grid marketing service system. Through a series of three rounds of investigation, the expert group discerns the importance of indicators and gathers risk evaluation data.

The survey session unfolds as follows:

Round 1: Identification of risk factors, formation of final opinions, and compilation of a table containing confirmed results for the indicators.

Round 2: Determination of risk importance, with adjustments made to the collection form as needed. Additional discussions are facilitated in this round to resolve any discrepancies.

Round 3: Determination of risk evaluation data, with corresponding adjustments made to the collection form and distribution to experts for completion.

Following the fine-tuning of indicators in the initial round and subsequent confirmation, a risk indicator system tailored to the migration of domestic database systems for the grid marketing service system is constructed. The collection form, meticulously designed to furnish background information and elucidate survey objectives, follows the prescribed three-round survey program. Ultimately, indicators are extracted and compiled, as shown in Table 1.

Table 1 Indication validation results table

Level 1 indicators	Secondary indicators
technology risk	Migration programme adaptability risk
	Risk of outdated testing methods
	Risk of software quality not meeting requirements
Data integrity risk	Risk of data loss
	Data inconsistency risk
	Risk of data corruption
Data security risks	data breach risk
	Data access control risks
	Data encryption risks
Performance Stability Risk	Risk of system performance degradation
	Response time delay risk
	Risk of decline in throughput
	Architecture compatibility risk
Business continuity risk	Business interruption risk
	Failure recovery risk
	Service level agreement compliance risk
Progress risk	Risk of overdue data migration
	Migration fallback timeout risk
	Risk of long response time to failures
Managing risk	Professional skill level risk
	Risk of improper segregation of duties
	Insufficient risk awareness of the team Risk
	Risk of miscommunication among personnel
cost risk	Risk of migration costs exceeding budget
	Risk of increased operation and maintenance costs
	Risk of decline in operational effectiveness
Compliance risk	Risk of compliance with laws and regulations
	Industry Standards Compliance Risk
	Intellectual Property Compliance Risks

2.2 Analysis of risk factor identification for domestic database system migration

Through the three-step risk identification method of "constructing the indicator base-indicator initial screening-indicator system confirmation", the risk indicator system for the migration of the domestic database system of the marketing service system has been identified, and specific analyses for various types of risk factors are as follows.

2.2.1 Technology risk

Migration Program Suitability Risk: Opting for an ill-suited migration program can escalate project workload and costs, or even trigger project schedule disruptions, necessitating the adoption of a new program [3].

Risk of Outdated Testing Methods: The prevailing testing methodologies employed by electric power enterprises for information systems are relatively antiquated, potentially resulting in the oversight of latent or low-probability errors. This, in turn, could impede the seamless progression of migration efforts.

Risk of Software Quality Falling Short of Requirements: Inferior software quality poses a threat to the overall efficacy of the migration project, encompassing factors such as usability, stability, and performance [4].

2.2.2 Data integrity risk

Risk of data loss: Part or all of the data may be lost during the migration process, causing problems such as incomplete information and business interruption for the enterprises [5].

Data inconsistency risk: Changes in data format, structure or content may result in data inconsistencies in the source and target databases, affecting business processes and decision-making accuracy.

Data corruption risk: network, hardware failure or human error may lead to data corruption or tampering, reducing data quality and affecting the normal conduct of business.

2.2.3 Data security risks

Data leakage risk: Failure to effectively protect sensitive data in the database may lead to data leakage, affecting corporate reputation, customer privacy, etc.

Data rights control risk: Failure to effectively manage and control user access to databases may result in data being accessed, modified or deleted by unauthorised users.

Data encryption risk: Failure to protect sensitive data with effective encryption may result in malicious access to or alteration of data during transmission, storage or processing [6].

2.2.4 Performance stability risk

Risk of system performance degradation: The new system's performance is not as good as the original system, which may lead to delays in business processes, slower response times, and reduced system availability and stability [6].

Response time delay risk: A delay in the response time of the new system may lead to a degradation of the user experience, affecting user satisfaction and even leading to user churn.

Risk of decline in throughput: A decline in throughput of the new system may result in the inability to satisfy a large number of requests being processed at the same time, affecting the normal conduct of business.

Architecture compatibility risk: Incompatibility between the new system architecture and the original system may result in functions not being realised or data not being migrated properly, affecting business processes and data integrity.

2.2.5 Business continuity risk

Business interruption risk: Migration operations or related issues may result in the inability of critical operations to proceed normally, affecting corporate production, sales and services, and consequently reputation and market position.

Failure Recovery Risk: Improper system configuration, technical problems, etc. may lead to system failures and the inability to restore normal operation in a timely and effective manner, affecting enterprise production and customer satisfaction.

Service level agreement compliance risk: Poor performance of the new system or operation and maintenance problems may result in failure to meet the targets set out in the service level agreement, giving rise to contractual disputes, liability and other issues.

2.2.6 Progress risk

Risk of data migration overrun: The actual time of the data migration work may be longer than expected, affected by unexpected problems, such as equipment failure, system corruption or network anomaly. This may lead to an extension of the overall project time, affecting the progress of other related work and increasing project uncertainty and risk [7].

Migration rollback timeout risk: If migration fails or serious problems occur, the system needs to be rolled back to its original operating state quickly and safely. However, if the rollback process takes too long and exceeds the expected recovery time, it may affect business continuity and stability, leading to customer complaints and decreased trust [8].

Risk of long failure response time: Failure response time is the time required from the discovery of a failure to the response. If a system fails, but the response time is too long to identify and resolve the problem in time, it may lead to business interruption and reduced customer satisfaction, affecting the reputation and market competitiveness of the enterprise [9].

2.2.7 Management risk

Risks to the technical level of professionals: The technical level of a professional's business has a direct impact on the success or failure of a migration project, and highly demanding skills and experience are critical to the success of a project.

Risk of inappropriate division of labour: Inadequate division of labour, in particular the departure of key personnel who cannot be replaced in a timely manner, may result in projects lagging behind and functions not being completed.

Insufficient risk awareness in the team: If the team lacks training and awareness of risk management, this may lead to ignorance of potential risks and insufficient preventive measures [9].

Miscommunication risk: Miscommunication between different departments may lead to misunderstanding of project objectives and schedule, increasing the risk and cost of project implementation.

2.2.8 Cost risk

Risk of over-budgeting of migration costs: Migrating funds in excess of the budget may lead to a deterioration of the financial situation of the enterprise, increasing the financial burden and affecting the project schedule and implementation results.

Risk of increased O&M costs: Increased O&M costs of new systems may affect the operational efficiency and cost management of the enterprise, reducing competitiveness.

Risk of decline in business benefits: A decline in business benefits due to the new system may affect customer satisfaction, corporate reputation and market competitiveness, creating an obstacle to long-term development [10].

2.2.9 Compliance risk

Risk of compliance with laws and regulations: Failure to strictly comply with relevant laws and regulations may result in the enterprise facing the risk of legal proceedings, fines, etc., damaging its reputation and interests.

Industry standards compliance risk: Failure to comply with industry standards and specifications may lead to system instability, poor performance or inadequate security, affecting normal business operations.

Intellectual Property Compliance Risk: Failure to properly handle intellectual property rights may lead to infringement lawsuits, claims and other risks, damaging the reputation and interests of the enterprise.

3. Risk Assessment for The Migration of The Home-Grown Database System for The Marketing Services System

The objective of this chapter is to establish a quantitative risk assessment model tailored to the migration of domestic database systems, specifically targeting the grid marketing service system. Initially, the risk level matrix is crafted through a qualitative risk analysis lens. Subsequently, a quantitative risk assessment model is formulated, leveraging trapezoidal fuzzy numbers and material element topology. This model is designed to accommodate the requirements of group decision-making and fuzzy reasoning. Ultimately, the migration risk associated with the domestic database system of the grid marketing service system is evaluated and analyzed, yielding insights into both the overall risk level and the risk level of individual indicators. These findings serve as a foundational reference for devising subsequent risk response strategies.

3.1 Weighting method based on C-OWA operator

In this study, the Combined Number Based Ordered Average Weighting (C-OWA) operator serves as the cornerstone for determining the weights of evaluation indicators, particularly suited for scenarios involving group decision-making by multiple experts [11]. In comparison with traditional hierarchical analysis methods, this approach offers enhanced practicality and operability.

The specific computation steps are delineated as follows: 1. Invitation of Experts and Fuzzy Language Scoring: A panel comprising k experts is convened to employ the fuzzy language scoring method for assessing the significance of each risk factor. Utilizing a nine-level linguistic assessment scale, encompassing scores ranging from extremely low (AL) to extremely high (AH), corresponding to the rank range of S0 to S8.2. Acquisition of Raw Data and Reordering: Raw data pertaining to each indicator are procured based on expert scores. Subsequently, these data are reordered from the highest to the lowest and enumerated from 0 to form a vector. The resulting table is shown in table 2.

Table 2 Nine-level fuzzy language value scale

fuzzy language level	linguistic terminology	Trapezoidal fuzzy number language values
S_0	Extremely low (AL)	(0.000,0.000,0.000,0.067)
S_1	Very Low (VL)	(0.000,0.067,0.133,0.200)
S_2	Low (L)	(0.133,0.200,0.267,0.333)
S_3	Medium Low (ML)	(0.267,0.333,0.400,0.467)
S_4	Medium (M)	(0.400,0.467,0.533,0.600)
S_5	Medium-high (MH)	(0.533,0.600,0.667,0.733)
S_6	High (H)	(0.667,0.733,0.800,0.867)
S_7	Very high (VH)	(0.800,0.867,0.933,1.000)
S_8	Very high (AH)	(0933,1.000, 1.000,1.000)

3.2 Risk assessment model based on trapezoidal fuzzy numbers and object element topology

Trapezoidal fuzzy numbers and material element topology represent two mathematical instruments instrumental in addressing uncertainty and ambiguity. Trapezoidal fuzzy numbers serve as mathematical constructs adept at characterizing ambiguity, while material element topology stands as a mathematical theory designed to grapple with uncertainty. Below outlines the general process of risk assessment modeling harnessing the capabilities of these two tools: Initially, the risk indicators slated for assessment are pinpointed, with trapezoidal fuzzy numbers employed to encapsulate the fuzziness inherent in the data. Each assessment indicator's possible range of values and distribution can be succinctly depicted using trapezoidal fuzzy numbers. These numbers are subsequently transmuted into object elements within Object Element Topology, culminating in the construction of an Object Element Topology model [2]. This model, in turn, proves instrumental in navigating uncertainty and executing risk assessment.

The modeling process unfolds as follows: the classical domain and section domain are initially determined, followed by the ascertaining of indicator weights [12]. Experts evaluate the importance of project risk factors, leveraging a nine-level fuzzy language scoring system to craft an array of evaluation indicators [12]. Subsequently, the closeness of each level is computed, with the closeness criterion deployed to adjudicate the project risk evaluation status. Leveraging the object element topology model, the risk level of each evaluation indicator, along with the overall risk level, is calculated. Subsequent steps involve dissecting the risk assessment outcomes, identifying potential risk factors and their impacts, and formulating commensurate response strategies and decisions. Continual refinement of the model ensues, with real-world feedback informing the optimization of both the model and data parameters, thereby enhancing the accuracy and reliability of risk assessment endeavors. By integrating trapezoidal fuzzy numbers and material element topology, it becomes possible to fashion robust risk assessment models, empowering decision-makers with insights to comprehend and contend with the risks stemming from uncertainty and ambiguity effectively [13].

3.3 Risk assessment for migration of national database systems

In this paper, the risk assessment of domestic database system migration is based on the overall domestic database system migration risk of the grid marketing service system as an assessment object, based on the domestic database system migration risk indicator system identified in the previous paper, and in accordance with the quantitative risk assessment scheme to assess and analyse to determine the domestic database system migration risk status [14].

3.3.1 Acquisition of the results of the evaluation of the risk of migration of the national database system

Firstly, based on the expert group of the indicator confirmation stage belonging to the previous section, the importance of the risk evaluation indicators for the migration of the domestic database system is evaluated, and the fuzzy evaluation results of the risk indicators are obtained as follows, as shown in Table 3 and 4:

Table 3 Fuzzy rating of secondary risk indicators for the migration of the national database system

Secondary indicators	K_1	K_2	K_3	K_4	K_5	K_6	K_7	K_8
Migration programme suitability risk (C11)	MH	H	H	MH	H	H	MH	H
Risk of outdated testing methods (C12)	L	L	M	ML	VL	VL	ML	L
Risk of software quality not meeting requirements (C13)	H	VH	H	H	VH	VH	VH	H
Risk of data loss (C21)	VH	VH	H	VH	AH	AH	H	VH
Data inconsistency risk (C22)	MH	MH	MH	MH	ML	MH	M	M
Risk of data corruption (C23)	L	VL	L	M	ML	ML	L	L
Risk of data breach (C31)	H	VH	H	VH	H	VH	H	AH
Data access control risk (C32)	MH	MH	M	M	M	ML	M	M
Data encryption risk (C33)	M	MH	M	MH	M	ML	ML	M
Risk of system performance degradation (C41)	VH	H	H	H	VH	MH	H	H
Response time delay risk (C42)	H	VH	H	H	AH	H	VH	VH
Risk of decline in throughput (C43)	L	L	L	L	VL	ML	M	M
Architecture compatibility risk (C44)	MH	MH	M	M	M	MH	M	M
Business interruption risk (C51)	H	VH	VH	H	H	H	H	H
Failure recovery risk (C52)	L	L	L	L	VL	ML	M	M
Service level agreement compliance risk (C53)	M	MH	M	MH	MH	H	H	MH
Risk of overdue data migration (C61)	H	H	VH	VH	H	AH	H	H
Migration fallback timeout risk (C62)	M	MH	MH	M	M	MH	MH	ML
Risk of long failure response times (C63)	L	L	VL	ML	L	L	M	L
Expertise level risk (C71)	VH	H	H	VH	H	H	H	AH
Risk of improper segregation of duties (C72)	M	MH	M	ML	M	M	MH	M
Risk of insufficient risk awareness in the team (C73)	L	ML	ML	ML	L	L	L	VL
Risk of miscommunication among personnel (C74)	M	M	M	MH	ML	M	M	M
Risk of over-budgeting of migration costs (C81)	M	M	ML	MH	H	MH	M	M
Risk of increased O&M costs (C82)	M	MH	M	M	M	ML	M	ML
Decline in operational effectiveness risk (C83)	H	H	H	VH	H	AH	H	H
Risk of compliance with laws and regulations (C91)	H	H	VH	VH	VH	H	H	H
Industry standards compliance risk (C92)	L	ML	L	L	L	L	L	ML
Intellectual property compliance risk (C93)	M	M	MH	M	ML	M	M	M

3.3.2 Risk level data preprocessing

In this paper, risk is assessed according to the formula "Risk value = Probability x Consequence", taking into account both the likelihood of the risk (denoted as P) and the severity of the risk (denoted as C). The two are multiplied and the data are preprocessed to obtain a quantitative risk matrix, which determines the range of values for each risk classification.

Table 4 Fuzzy rating of risk indicators at the level of migration of the national database system

Level 1 indicators	K_1	K_2	K_3	K_4	K_5	K_6	K_7	K_8
Technology risk (B1)	M	M	MH	M	M	MH	MH	MH
Data integrity risk (B2)	VH	H	H	VH	AH	H	AH	VH
Data security risk (B3)	VH	VH	H	VH	AH	AH	VH	AH
Performance stability risk (B4)	M	M	M	MH	MH	M	M	MH
Business continuity risk (B5)	AH	H	VH	H	VH	H	H	H
Progress risk (B6)	M	M	M	M	MH	M	ML	M
Managing risk (B7)	L	L	ML	L	L	L	L	VL
Cost risk (B8)	H	H	MH	H	VH	VH	VH	H
Compliance risk (B9)	VL	L	L	VL	L	L	AH	VL

Based on the results of the calculations, the table qualitative risk matrix can be transformed into a quantitative risk matrix, as shown in Table 5.

Table 5 Quantitative project risk level matrix

risk level		risk likelihood				
		Very Low (VL)	Comparative low (L)	Medium (M)	Comparative high (H)	Very high (VH)
Severity of risk	Very Low (VL)	0.032	0.047	0.077	0.107	0.137
	Comparative low (L)	0.047	0.072	0.122	0.172	0.222
	Medium (M)	0.077	0.122	0.212	0.302	0.392
	Comparative high (H)	0.107	0.172	0.302	0.432	0.562
	Very high (VH)	0.137	0.222	0.392	0.562	0.732

The risk factor ratings in this table are classified from highest to lowest. I, II, III, IV Four levels, with higher level risks being prioritised.

3.4 Analysis of risk assessment results

The model facilitates the computation of the distance between each risk indicator and every risk level. By applying the concept of the distance formula, alongside the weight calculation outcomes of the risk evaluation indicators delineated in the preceding section, an analysis table detailing each risk evaluation indicator pertinent to the domestic database system migration is derived, as shown in Table 6 [15].

The weights are reorganized in accordance with Table 6, and a bar chart is generated to underscore the significance of each evaluation indicator. Employing a color-coded scheme, the risk level of each evaluation indicator is visually identified, facilitating an analysis of the contribution of each indicator's risk level to the overall risk level of domestic database system migration. Figure 1 provides a visual representation of the risk analysis metrics for the migration of the homegrown database system.

Among the 11 indicators, the risk level of data loss risk and data leakage risk is categorized as level I, denoting the highest risk level. Conversely, the risk level of 10 indicators, including the risk of service level agreement compliance and the risk of data inconsistency, is classified as level II, indicative of a higher risk level. Two indicators, encompassing the risk of data encryption and the risk of throughput decline, are assigned level III, signifying a general risk level. Lastly, six indicators, such as the risk of data corruption and the risk of failure recovery, are designated as level IV, representing a lower risk level. Furthermore, it is noteworthy that indicators with higher risk levels are typically positioned toward the forefront of all evaluation indicators. Notably, the two indicators with the highest weights both belong to higher risk levels, thereby exerting a more pronounced influence on the overall risk level of domestic database system migration. Consequently, the migration of a homegrown database system incurs heightened risk levels concerning data security and business continuity.

Table 6 Risk analysis of evaluation indicators for the migration of the national database system

norm	C11	C12	C13	C21	C22	C23	C31	C32	C33
weighting	0.0397	0.0138	0.0449	0.0826	0.0555	0.0243	0.0772	0.0470	0.0463
weighting	13	23	10	1	6	17	2	7	8
risk level	I	IV	I	I	II	IV	I	II	III
norm	C41	C42	C43	C44	C51	C52	C53	C61	C62
weighting	0.0315	0.0340	0.0125	0.0204	0.0683	0.0239	0.0558	0.0461	0.0327
weighting	16	14	25	19	3	18	5	9	15
risk level	I	I	III	II	I	IV	II	I	II
norm	C63	C71	C72	C73	C74	C81	C82	C83	C91
weighting	0.0140	0.0167	0.0106	0.0055	0.0105	0.0435	0.0404	0.0637	0.0201
weighting	22	21	26	29	27	11	12	4	20
risk level	IV	I	II	IV	II	II	II	I	I
norm	C92	C93							
weighting	0.0061	0.0126							
weighting	28	24							
risk level	IV	II							

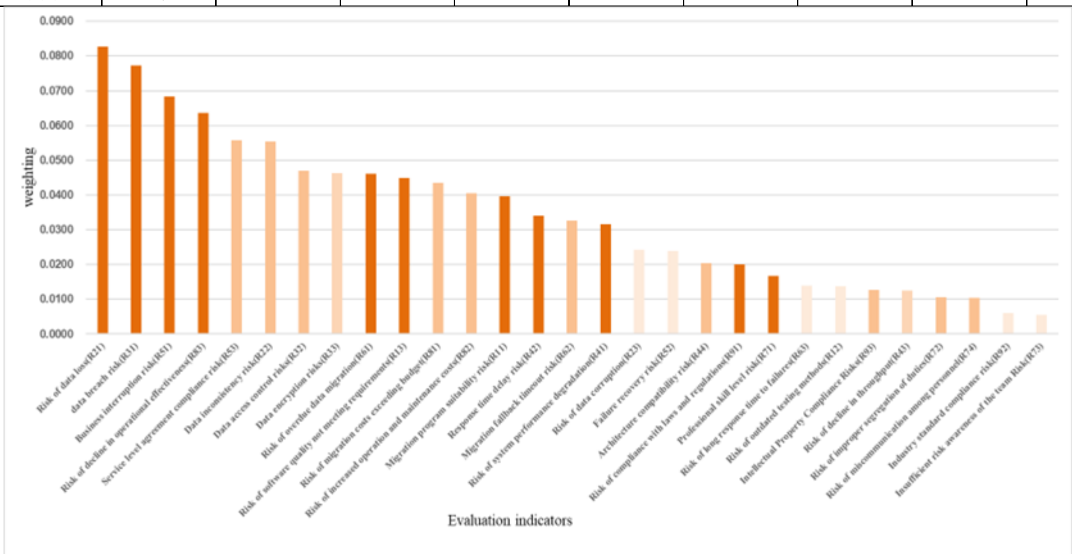

Figure 1 Risk analysis of evaluation indicators for the migration of the national database system

Following the comprehensive analyses outlined above, the diverse array of risks entailed in the migration of the grid marketing service system's homegrown database system necessitates targeted risk response strategies.

4. Migration of Domestic Database System for Marketing Service System Feasibility Assessment

In response to the risk of adaptability of the migration program, an in-depth assessment of the homegrown database system's compatibility with existing systems is imperative. This entails identifying potential technical hurdles and devising corresponding solutions to mitigate them effectively [16].

To address the risk stemming from outdated testing methods, a meticulous analysis of the shortcomings inherent in current testing methodologies is warranted. Subsequently, updated testing methods and tools should be proposed and implemented to ensure the stability and performance of the migrated system meet desired standards [17].

Regarding the risk of software quality falling short of requirements, stringent quality management measures must be enforced. This includes but is not limited to, conducting code reviews, implementing static analysis, and rigorously conducting unit and integration testing to uphold software quality standards [18].

Mitigating risks associated with data loss, inconsistency, corruption, and leakage necessitates the establishment of robust protective mechanisms. This encompasses instituting regular backup protocols, leveraging data encryption technologies to safeguard data security, and enforcing stringent access controls to prevent unauthorized data access.

Addressing concerns related to data rights control involves implementing a rigorous data rights management strategy. This may entail utilizing role-based access control (RBAC) mechanisms or other access control protocols to ensure only authorized personnel can access sensitive data.

To mitigate risks related to system performance degradation, response time delays, and throughput deterioration, comprehensive system performance evaluations and optimizations are essential. This includes optimizing database designs, query statements, and indexes to bolster system performance and responsiveness.

Furthermore, addressing architecture compatibility risks necessitates conducting thorough system architecture compatibility testing. This ensures seamless integration and compatibility of the new architecture with existing systems, thereby averting potential compatibility issues [19].

To manage risks pertaining to data migration overruns, migration fallback overruns, and prolonged response times to failures, meticulous project planning and scheduling are indispensable. A robust monitoring mechanism should be established to promptly identify and address issues, thereby ensuring project progress and response times remain within acceptable parameters [20].

Addressing team and personnel risks involves building proficient teams and providing requisite training to enhance skill levels, communication aptitude, and risk awareness. This empowers teams to effectively navigate challenges encountered during the migration process.

Lastly, mitigating business benefits, costs, and legal risks entails assessing potential cost escalations and legal/regulatory compliance challenges during the migration process. A comprehensive budget and compliance program should be developed to manage these aspects effectively. Additionally, analyzing the impact of migration on business benefits and risks in terms of industry standards compliance and intellectual property rights ensures business continuity and adherence to relevant regulations throughout the migration process [21].

5. Conclusion

In the current global landscape, safeguarding core technologies from external restrictions has become imperative, thus rendering localization an inexorable trend. Through localization endeavors, organizations bolster their autonomy and control over critical technologies. Within this transformative paradigm, migration of domestic database systems emerges as a pivotal avenue for enterprises to realize their localization transformation strategies. By constructing a robust risk management model for the migration of the grid marketing service system's homegrown database, coupled with quantitative analyses of project risk factors and inherent risks, the interplay of project risk factors can be elucidated, facilitating more precise risk analysis and evaluation. This process, rooted in the refinement of risk management elements, enables the formulation of tailored risk response strategies and solutions tailored to the unique needs of the project at hand. Building upon this foundation, further refinement of risk management elements and the development of project-specific risk response strategies and solutions can be achieved, aligning closely with the project's specific context.

This paper focuses on the feasibility of migrating domestic database systems for the power grid marketing service system, elucidating principles and methodologies for risk identification and constructing an assessment model grounded in trapezoidal fuzzy numbers and material element topology. Corresponding risk mitigation strategies are proposed to address identified risks. The comprehensive risk identification, analysis, assessment, and mitigation strategies outlined for the migration of domestic database systems within the marketing service system aptly cater to the exigencies of feasibility studies pertaining to domestic database system migration, offering high relevance and tangible practical value. The targeted nature of these research findings, coupled with their robust practical application potential, furnish valuable insights for enhancing management practices and serve as a reference point for similar domestic database system migration endeavors.

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