

DEVELOPMENT OF A BASIC MODEL FOR CHOOSING INFORMATION SYSTEM CLOUD MIGRATION STRATEGY

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Cloud migration of information systems (IS) in digital transformation is increasingly seen as a comprehensive change in the management of resources, risks and costs, and not just the technical transfer of components to the cloud. Therefore, pre-migration planning becomes key, where goals, KPIs, constraints and assumptions regarding workload and costs are determined; Without a formalized approach, the strategy is often chosen incorrectly, which increases the risk of technical and financial errors. The relevance is growing due to the strengthening of regulatory and security requirements and the complexity of IS architectures, which makes fragmented planning ineffective. The existing approaches are mostly developed at the level of individual instruments but are not sufficiently integrated into the reproducible procedure of transparent strategy selection [1].

The purpose of the work is to formalize the task of optimizing resources at the pre-migration stage of planning cloud migration of IS by developing and justifying a KPI-oriented (Key Performance Indicators) approach that provides a transparent comparison of alternatives for the business, and a formalized choice of strategy based on measurable performance indicators with reproducible results. To achieve the goal, the work focuses on two applied tasks: building a KPI-oriented model for choosing a strategy and experimental approbation of the model on the example of comparing alternatives.

The basic hypothesis is that for the reproducible choice of the optimal strategy at the pre-migration stage, it is not enough just to fix the «before/after» KPIs; It is necessary to form a quantitative model, where load characteristics and resource/architectural dependencies are translated into a set of normalized KPIs and financial indicators and supplemented by risk and constraint assessments, after which alternatives can be compared in a single procedure as a multi-criteria compromise [2].

The state of the IS before migration is described by a set of key performance indicators, and the acceptability of the result after migration is determined by the achievement of specified target thresholds. Heterogeneous metrics are agreed by normalizing and bringing them to a single direction of interpretation, which makes it possible to correctly compare alternatives. For each strategy, the expected impact on indicators is set, which can be adjusted by the migration conditions (context). Generalized business priorities are considered by metric weights, and non-compliance with target requirements is reflected by a penalty for not meeting thresholds. At the same time, the cost component is considered as an assessment of the complexity/labor intensity of the strategy implementation; The final choice is formalized by an integral criterion that combines «quality» in terms of KPIs and costs and is minimized to obtain a recommendation.

The model was tested using the example of comparing three cloud migration strategies: Lift-and-Shift, Re-platforming, and Re-engineering, using the specified

base KPIs, normalization reference limits, and target thresholds. For each strategy, a projected post-migration profile of indicators was formed and the degree of compliance with the minimum acceptable requirements due to deficits relative to thresholds was determined. The results showed that Lift-and-Shift has the highest probability of not reaching part of the threshold requirements, Re-platforming in most cases ensures their fulfillment, and Re-engineering demonstrates the most complete compliance in terms of KPIs but is accompanied by higher complexity of implementation. The integral criterion, which combines the penalty for not achieving the KPI and the cost component with a manageable trade-off parameter, provided a reproducible ranking of alternatives and identified Re-platforming as the most balanced option under the conditions of the example.

Thus, the proposed KPI-oriented model sets a reproducible procedure for choosing a cloud migration strategy in conditions typical for pre-migration planning: limited time, incomplete data, the need for explainability for business stakeholders. At the practical level, the approach is aimed at reducing uncertainty and decision-making costs at the pre-migration stage, by reducing the time and financial costs of preparing the evidence base, increasing the reproducibility of estimates and reducing the likelihood of wrong choice of strategy, which reduces the risks of budget overruns, missed deadlines and accumulation of technical debt after migration. The theoretical value lies in the formalization of the «strategy» as a manageable multi-criteria compromise, which simultaneously considers the achievability of threshold requirements for KPIs and the resource/cost component through the structure of the integral criterion.

It is advisable to associate the further direction of research with the empirical calibration of model parameters on real migration cases and the expansion of the observation base for different classes of information systems and domains. The development of the contextual part of the model by expanding the list of factors and checking their impact on the accuracy of recommendations, as well as integrating the approach with load profiling tools and automated collection of metrics, is also promising.

References: 1. Hosseini Shirvani, M., Amin, G. R., & Babaeikiadehi, S. (2022). A decision framework for cloud migration: A hybrid approach. *IET Software*. <https://doi.org/10.1049/sfw2.12072>. 2. Henning, S., & Hasselbring, W. (2022). A configurable method for benchmarking scalability of cloud-native applications. *Empirical Software Engineering*, 27(6). <https://doi.org/10.1007/s10664-022-10162-1>.