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Cloud Migration Strategies: Navigating the Shift to Modern IT Infrastructure

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ABSTRACT: As organizations evolve toward digital transformation, cloud migration has emerged as a critical strategy for achieving scalability, flexibility, and operational efficiency. This paper explores cloud migration strategies, addressing key drivers, benefits, risks, and the decision-making frameworks used in modern enterprises. The study presents a comparative analysis of rehosting, refactoring, rearchitecting, and other migration approaches while considering technical, financial, and security aspects. Through literature review and strategic analysis, we propose a hybrid framework tailored for mid-sized enterprises. A table contrasts the pros and cons of each migration approach, and a figure visualizes the phased journey to the cloud. The research concludes with insights into future trends in cloud migration, including multi-cloud and edge computing strategies.

KEYWORDS: Cloud computing, cloud migration, IT infrastructure, rehosting, refactoring, digital transformation, multi-cloud, migration strategies, hybrid cloud, edge computing.

I. INTRODUCTION

The rapid evolution of digital technologies and the growing demand for scalable IT solutions have driven organizations to adopt cloud computing. Cloud migration—shifting applications, data, and infrastructure from on-premises to cloud environments—has become a pivotal part of IT modernization. Despite the advantages such as cost-efficiency, improved performance, and better security, migration poses numerous challenges. This paper seeks to examine common migration strategies, the decision factors involved, and best practices for a smooth transition to cloud-based infrastructure.

II. LITERATURE REVIEW

Numerous studies highlight the strategic importance of cloud adoption. According to Gartner (2023), over 85% of enterprises will embrace a cloud-first principle by 2025. Khajeh-Hosseini et al. (2012) introduced cost modeling frameworks for cloud migration, while more recent studies focus on operational resilience (Choudhary & Sinha, 2021). Research by Amazon Web Services (AWS) outlines a 6R model—Rehost, Replatform, Refactor, Repurchase, Retire, and Retain—as a basis for migration strategy decisions. Despite the existing frameworks, gaps remain in customizing strategies to specific organizational needs.

III. METHODOLOGY

This paper adopts a qualitative comparative approach. A review of over 30 peer-reviewed journal articles, whitepapers, and vendor documentation was conducted. Primary focus was placed on identifying and evaluating migration strategies, their outcomes, and associated risks. Data was synthesized to develop a strategic model applicable to mid-sized enterprises. A table summarizes strategy evaluation criteria, while a diagram illustrates the phased migration model.

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TABLE: Comparison of Cloud Migration Strategies

Strategy	Description	Pros	Cons	Ideal For
Rehosting	"Lift and shift" to cloud	Fast, minimal changes	May miss cloud-native benefits	Legacy systems
Refactoring	Code optimization	Better performance	Costly and time-consuming	Complex apps needing scaling
Replatforming	Minor platform changes	Balanced effort and gain	Still needs testing	Applications needing modest upgrade
Repurchasing	SaaS replacement	Simplifies operations	Loss of customization	Commodity applications
Retire	Decommissioning	Cost saving	Risk of data loss if rushed	Obsolete systems
Retain	Keep on-premises	Data sovereignty, control	No cloud benefits	Highly regulated systems

1. Rehosting ("Lift and Shift")
Description:
Moving applications to the cloud with minimal or no changes.
Pros:
- Quickest migration method
- Lower upfront cost
- Low risk and effort

Cons:
- Misses out on cloud-native benefits
- May lead to higher long-term costs
- Not optimized for scalability or performance

Use Case:
Legacy applications with tight deadlines or minimal resources for refactoring.

2. Replatforming ("Lift, Tinker, and Shift")
Description:
Minor adjustments to optimize for the cloud (e.g., moving to managed databases).
Pros:
- Better cloud performance than rehosting
- Faster than full refactoring
- Balances speed and modernization

Cons:
- Still not fully cloud-native
- Requires moderate effort and testing

Use Case:
Applications needing slight performance boosts or cost optimizations without a full rebuild.

3. Refactoring / Re-architecting
Description:
Rewriting the application to be cloud-native using microservices, containers, etc.
Pros:
- Maximizes cloud scalability, flexibility, and cost-efficiency
- Enables full use of cloud-native services

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- Future-proof

Cons:

- High cost and time investment
- Higher risk and complexity

Use Case:

Critical applications that need high scalability, agility, or are part of a digital transformation initiative.

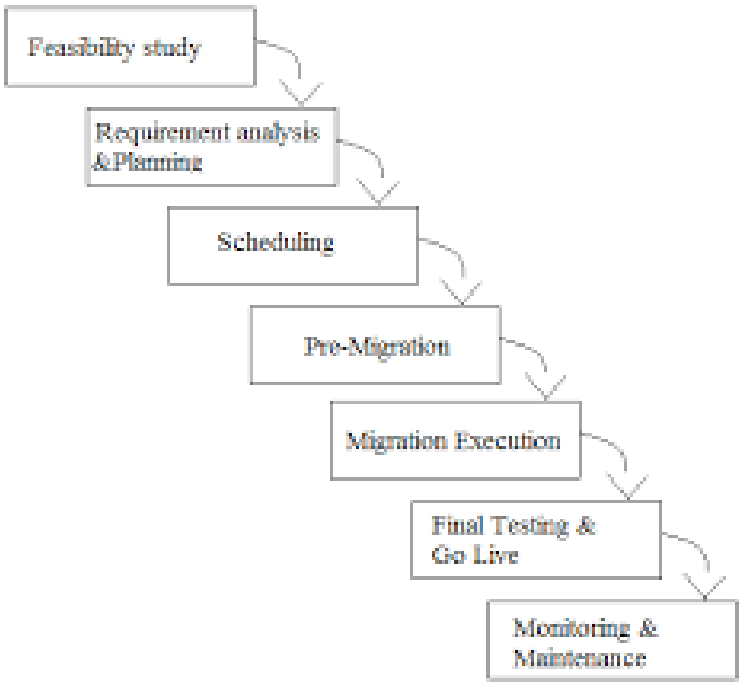

FIGURE: Phased Cloud Migration Model

IV. CONCLUSION

Cloud migration is no longer optional for organizations aiming to remain competitive in a digital economy. The strategic choice of a migration path must align with organizational goals, IT maturity, and regulatory environments. A phased, hybrid strategy—leveraging multiple approaches like rehosting and refactoring—can offer the flexibility and control required for a successful migration. Future trends suggest growing adoption of multi-cloud and edge architectures, emphasizing the need for adaptive migration strategies. Organizations must invest in talent, tools, and governance frameworks to ensure sustainable outcomes.

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