



# A Swift Ladder to Cloud | GlobalLogic's Tactical Approach

**How and What** to Estimate For Migrations to Cloud

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# Contents

Abstract	2
Introduction	3
Discovery and Advisory Phase	4
Assess Cloud Readiness from Business and Technology perspective	
Discover Overall Inventory	
Assess Architecture	
Assess Process Management	
Strategy of migration: Lift and Shift	6
Prepare	
Execute	
Strategy of migration: Re-platform and Re-architecture	8
Prepare	
People Perspective	
Process Perspective	
Execute	
Architecture and Integration	
Total Cost of Ownership	10
Automate-First	10
Verification and Validation	11
Cutover	11
Disaster Recovery Plan	12
Documentation	12
Conclusion	13

# Abstract

Cloud platform owners are providing the technology industry with various cloud platform solutions and specific migration guides. With decently structured recommendations, business organizations can begin to strategize the migration of their product workloads. How then is this paper different from already existing guidelines published by various cloud vendors?

This paper helps provide practical insights and curated estimates from experiments on various small and large-scale cloud migrations. The real-time effort evidence comes not only from brownfield but greenfield executions that solve different core business challenges, sizes of workloads, and desired end-state architectures.

This paper is intended as a cheat book for architects, engineering program managers, and lead developers to estimate and plan the efforts for enterprise migrations.

# Introduction

With the advent of the cloud ecosystem and technology stacks updating quickly, migrations to the cloud that began a few years ago have now come of age.

The industry by and large recognizes now the benefits of adopting cloud, so they are not called out explicitly in this paper. Rather, this paper emphasizes the significance of evaluating migration strategies, following the best-fit migration strategy scrupulously, and being aware of the underlying streams of migration work.

**Cloud migration** is often a term used for cloud enablement. Whether it is brownfield development (also known as the migration of existing workloads) or greenfield application development towards cloud enablement, the strategy should be around the five pillars of migration: Costs, Operational Efficiency, Performance Efficiency, Security, and Reliability.

To illustrate the step-by-step strategy, established facts from different cloud migration use cases and the motivation behind the migrations are considered, and then broadly categorized into two types for the scope of this paper. The first type is migrating the on-premises large-scale workloads **as-is with partial re-platforming**. The second type is **refactoring and re-architecting** a mid-size workload migration.

Use case for migration	Primary Motivation for migration	Compounded benefits of migration
Comprehensive regulatory platform for managing compliance, licensing and registration	Performance during peak business season	Scalability
A suite of eleven security applications rapidly create a global market	Optimize Capital Expenditure	Focus on enhancement of business functions
Customer Relationship Management (CRM) lawncare software providing service assistant with web and mobile channels, customer website, and marketing products.	Modernization, Refactor for a uniform technical architecture	Business growth, Better User experience
Complete solution of home-listing software products and services to help real estate professionals serve their clients	Decommission on-premise data center	Pave way to leverage new age technologies
Database Migration from Oracle to SQL	Uniform database and Cloud enablement	Centralized administration, Re-leverage skill set

This paper discusses each migration type and the recommended comprehensive plan of action in pre-migration, migration, and post-migration stages.

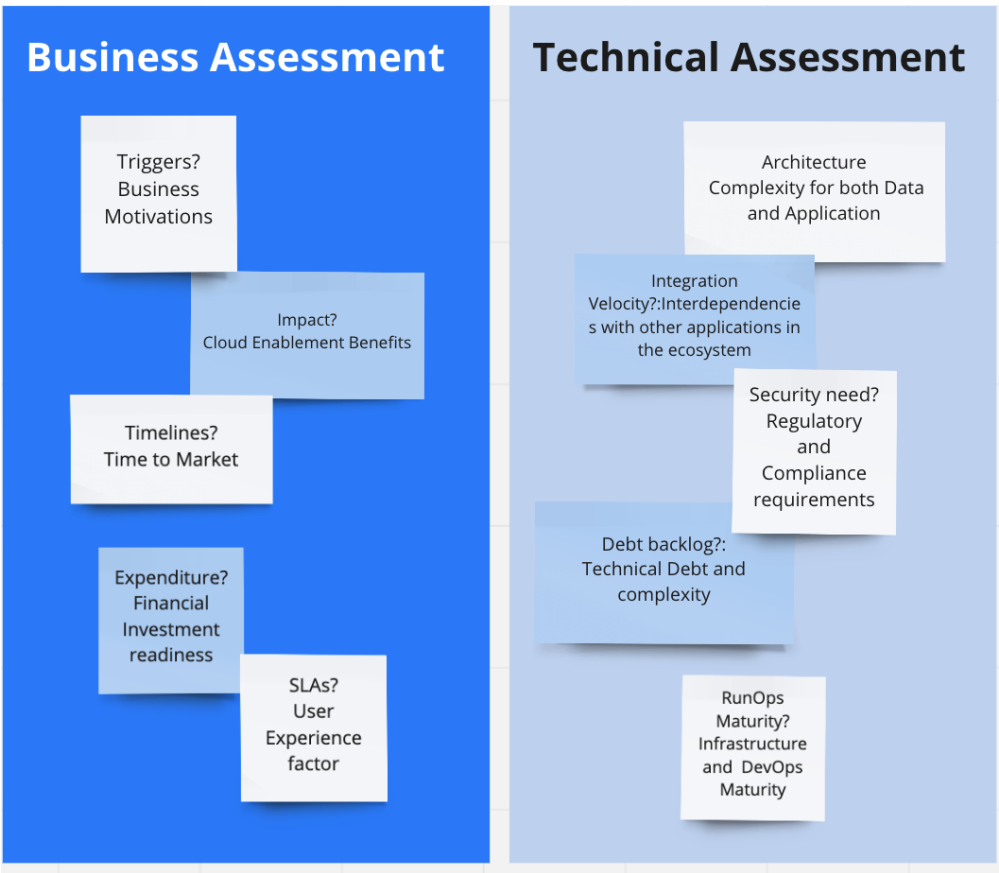
This paper presents strategies in cloud agnostic manner. However, the examples may mention a specific cloud product to better illustrate the step. Hence, to get the most from this paper, it is preferable to have a basic know-how of the different services and features from at least one cloud product like AWS or Azure.

# Discovery and Advisory Phase

An organization's cloud needs come in various shapes and sizes. It is important to conduct a thorough assessment and discussion of both business and technology perspectives with stakeholders and executives. This assessment exercise lays out the groundwork for advising on migration strategy and execution efforts.

## Assess Cloud Readiness from Business and Technology perspective

The different dimensions for the business and technology sides are outlined in the diagram.



We suggest that each dimension above be scored numerically to derive a scientific justification of the recommendation. The scoreboard becomes a base document in the assessment phase, which corroborates the recommendations in the advisory phase.

Divide the discovery phase into three elemental parts to record the scores.

## Discover Overall Inventory

Provide different views of the inventory: inventory by application, inventory by operating systems, inventory by data center, and inventory by production and non-production. The inventory includes the physical and virtual servers, as well as storage used. Leveraging discovery tools from the cloud market will help calculate the inventory, which can then be organized into different categories.

## Assess Architecture

Evaluate the architecture holistically, which at the minimum includes assessing design from scalability and reliability, technology stack and depth of code cleanliness, and build and deployment workflow.

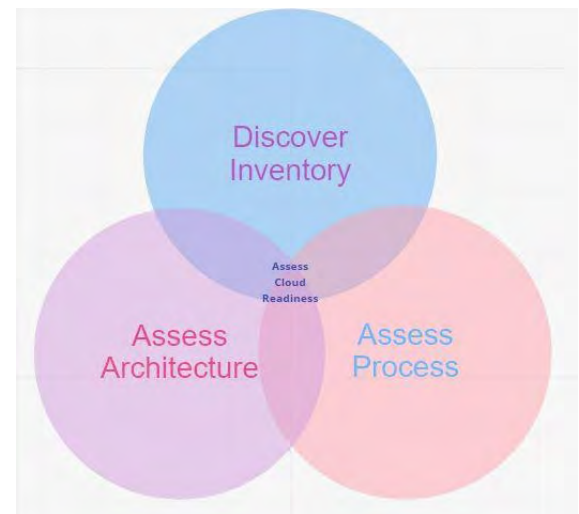
## Assess Process Management

While the technical assessment plays an important role, the process ecosystem cannot be ignored. Often, different application teams operate in silos and repeat the same process. Coordination between teams is lacking, and there is no awareness of possible sharing of licensed tools, under-utilized infrastructures, and even common software services.

Tools can span from monitoring, debugging, reporting and likewise. The build and deployment infrastructure using CI/CD tools can be reused.

Based on the responses, findings, and thorough assessment, update the scoreboard and share with the stakeholders as an interim artifact to get early reviews. A migration plan should now be illustrated. Coverage in the following areas helps obtain a vote of confidence from the stakeholders.

- Strategy, recommended architectural approaches, and the best fit
- TCO (Total Cost of Ownership)
- Automate-first approach
- Verification and validation
- Cutover plan





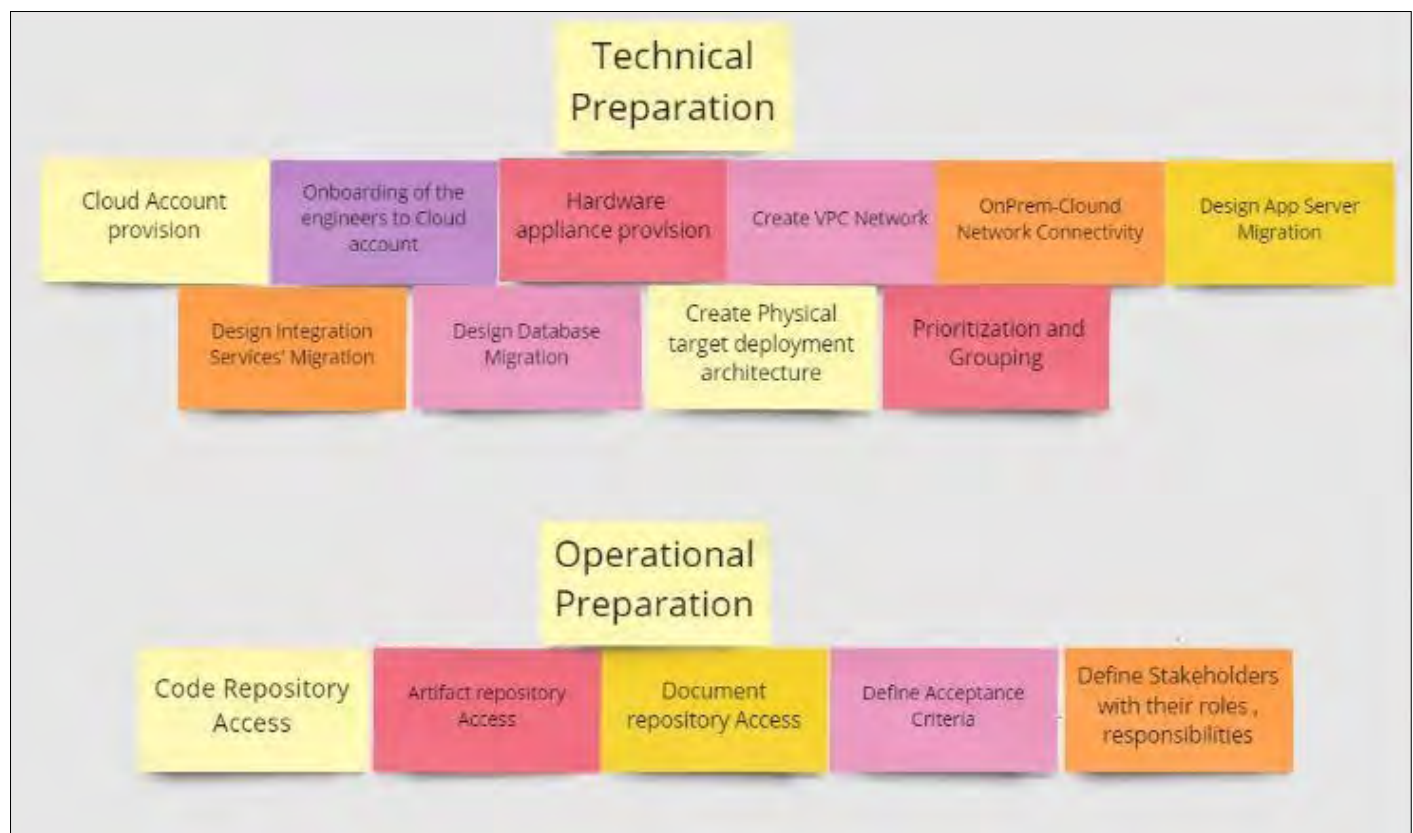
# Strategy of Migration: Lift and Shift

Lift and Shift (also known as Re-hosting) is one of the 6 Rs of migration. As the name suggests, workloads are migrated with current architecture and configuration and involve no optimizations. Minimal re-platforming may be required. To start this process, a comprehensive checklist should be prepared, submitted, and tracked on a daily basis. Templates brainstormed from real ground episodes should be the pick-up point for pre-migration preparation.



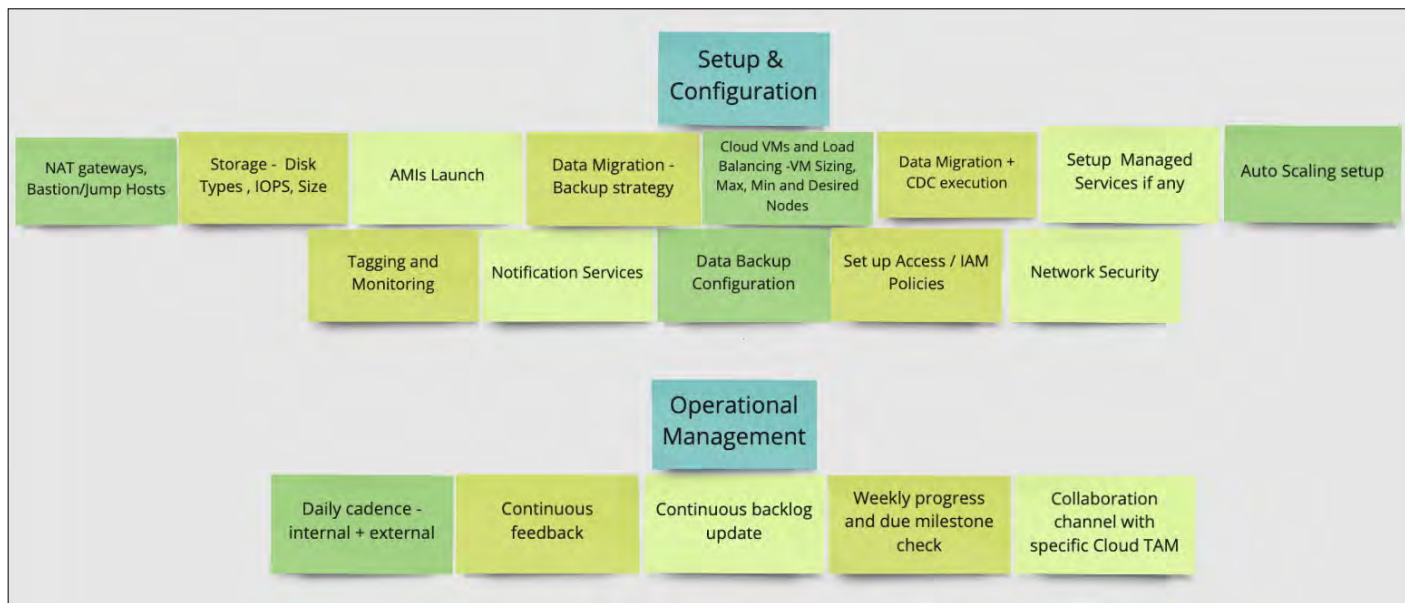
## Prepare

The pre-migration readiness should consider both technical and operational facets in detail in multiple areas. The checklist below, which may require further elaboration, would be a good opening strategy.



## Execute

Companies who use Lift and Shift types of migrations usually expect to use infrastructure-as-services and require minimal component setup and configuration(see the template below). Company employees will need a good cloud experience to implement the different elements. This means that additional efforts should be considered if the organization foresees a learning period for building proof of concept (POC).





# Strategy of Migration: Re-platform and Re-architecture

Re-platforming and Re-architecting is an advanced kind of cloud migration, and at times is also an enhancement to the re-hosted applications from earlier phases. The preparation takes a longer effort in the dimensions involving both people and processes.



## Prepare

### People Perspective

The technical assessment and some of the core problem areas that the customer cites are often scored to a candidature for refactoring the existing architecture and code. A mere Lift and Shift with dynamic scaling would not address the root cause. The challenge here is that the customer may not have thought and planned beyond just migrating the workload as-is or using the platform as a service variant of the application and database server. There could be a need to plan a sub-phase to educate business partners on the value addition of re-architecting and leveraging cloud platform-managed services. There may be a hesitancy around costs and the lack of cloud skillsets, which may stall the assessment recommendation. Companies should conduct education sessions, share success stories, and create portrayals of a well-defined target architecture state.



### Process Perspective

It is important that companies create and save documents that explain the process of developing software products. Organizations recognize this need over time as employees move in and out of teams, project management tools evolve, and adoption is slow. Hence, one may not find requirements, decisions, and approaches sufficiently documented or versions maintained. The practical option is to interact initially with the SMEs, reverse engineer, and circle back on the clarifications. This cycle runs over the duration of implementation, hence the planning phase should not overlook the required time and effort.



## Execute

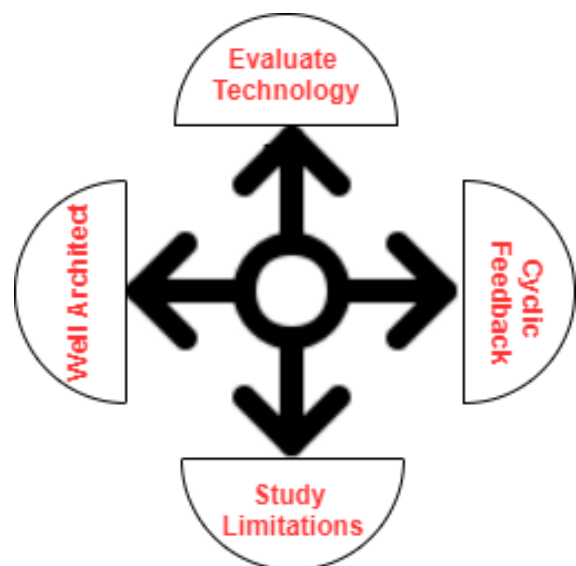
### Architecture and Integration

The scope of work is broader in re-platforming or re-architecting type of migration, and it requires diligent considerations and efficient planning. This migration is as good as a greenfield development, where the requirements need to be understood from existing implementation and converted using a new or upgraded technology stack. For example, conventionally the legacy workloads use SQL databases for every type of data storage and retrieval needs. In the new architecture, the data store has to be evaluated for its correct abode by adapting to higher SQL versions or one or more types of NoSQL types. Selecting between cloud-native NoSQL databases like Azure Cosmos DB, AWS DynamoDB, MongoDB, etc. may be required. Similarly, choosing between different variants of Azure SQL viz. Standalone SQL, SQL Database and SQL Managed Instance may be needed.



On the application tier, there is a need to assess if the legacy monoliths will be competent for the next five to seven years or whether they need to be broken down into micro or nano services architecture. Companies need to choose the best fit from different options for the capabilities and limitations they require. For example, choosing between AWS ECS and EKS, SQS or Kinesis, etc. Organizations should adopt well-architected cloud frameworks with strongly recommended principles. These principles include twelve-factor methodology and embedded security in each factor.

- **Shift Up:** Evaluate technology choices. Create the needed proof-of-concepts.
- **Shift Down:** Study the cloud service limitations before design. Verify if the evaluated technology fits holistically.
- **Shift Left:** Implement methodologies like well-architected frameworks, twelve-factor app principles, etc.
- **Shift Right:** Solicit feedback, govern, monitor, and act continuously.



# Total Cost of Ownership

It is commonly known that cloud services are price-based, and each cloud service has its own metrics that accrue costs. It becomes very important to appraise the finance owner of the costs. We advise companies to factualize the costs with different dimensions. For example, when both Linux and Windows-based servers are being migrated from multiple data centers in the Lift-Shift model, the costs could be presented operating system-wise, applications-wise, and datacenter-wise.

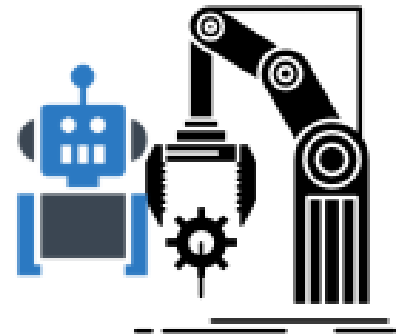
A second area is to prepare and present comparative costs when there is more than one option for leveraging a service capability. As an example, the API gateway could be more cost-effective from a third-party vendor than a cloud-native vendor.

Lastly, the difference between existing costs and new costs over a minimum of a three-to-five-year tenure model should be outlined. Thus, cost calculation is an exhaustive and iterative exercise, and organizations should plan for it accordingly.



# Automate-First

Automating as much of the cloud infrastructure as possible will result in replicating the creation of resources in a shorter time and with fewer errors. Automated infra setup and configuration, popularly known as Infrastructure-as-Code also enables a readiness to set up a Disaster Recovery environment.



# Verification and Validation

After the architecture deliberation, implementation, and an automated deployment, the verification and validation phase starts. Cloud verification is a valid phase for any type of migration to determine whether the migration has been conducted correctly without any bugs.

Cloud validation, on the other hand, certifies if the migrated application conforms to the business requirements.

Depending on the kind of migration, cloud verification and validation should work together holistically to cover functionality, security, performance, interoperability and compatibility, as well as network, load, and stress testing after migration.

Cloud vendor-provided tools should be leveraged as they are specifically designed to address cloud aspects and assurance. For example, for security testing in AWS, tools like AWS Guard and AWS Inspector provide security assessments and recommendations on how to reduce vulnerabilities. In addition, some cloud hosted workloads need to be connected to on-premise ecosystems, and reliable network testing needs to be conducted. As an example of network testing from Azure cloud platform to data centers, Azure connectivity tools can be used which provide both link connectivity and link performance tests under load.



# Cutover

The cutover phase should have a plan approved by the migration team as well as application and data owners.

The plan should outline the **cutover window**, the presence of the mandatory **team and their time zones**, the **communication channel, monitoring details**, and **go/no-go** criteria for the user acceptance. Most importantly, the rollback strategy with the execution plan should be present. The monitoring details should include the period of monitoring, the owners at application, and the database and infrastructure level to handle undesirable events.



# Disaster Recovery Plan

A disaster recovery course of action should be discussed and agreed upon with the stakeholders. Depending on the application criticality and cost affordability, disaster recovery environments can be set up as required. IaC (Infrastructure-as-Code) aligned to an approved disaster recovery plan will smoothen the re-setup of cloud environment in an emergency situation.



## Documentation

As stated earlier in this paper about the need for documentation, the IT team and application owners will demand documents that include environment setup runbooks, cloud architecture, cloud configuration, monitoring metrics, and cloud testing procedures and tools. Companies should allow sufficient time for this important activity.



# Conclusion

Transforming to the cloud ecosystem is not just a technical impact but profoundly a deep-rooted change in traditions. The new cultural adoption seeks a gradual percolation of rationale and confidence for every stepping stone put forth with each stakeholder.

A customer-centric mindset compounded with a predefined tactical strategy, as laid out in this paper, avails acquiring scrupulous skills over a period of time to smoothly sail from on-premise data centers into cloud-based platforms.

**All Skills  
are  
Learnable**

*- Brian Tracy*



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