

# How to Execute a Data-Driven Approach to Cloud Migrations

## **Essential Insights for Successful Cloud Migration and Modernization**

Simplifying and Optimizing your Cloud Journey  
Requires Asking the Right Questions and Analyzing  
the Right Data

# Introduction

**For companies of all sizes in virtually all industry sectors, moving to the cloud is no longer an emerging trend – it's a planned imperative.** According to Gartner Research's report, *Market Insight: Should You Build Cloud Management Platforms or Components?* by Brandon Medford and Craig Lowery, "The broad set of cloud management point solutions has grown as a response to rapid public cloud adoption. However, as...cloud customers start thinking of cloud as 'just the way we do IT,' customers will also begin to expect comprehensive cloud management solutions from both traditional and newer system management vendors."

There's no mystery to this industry-wide, worldwide movement from on-premises IT implementations to cloud-based IT deployments. As a platform, the cloud provides numerous benefits to organizations that rely on information technology to run their businesses and compete in today's global marketplace.

Key among these benefits are:



**IT cost reductions**, including both capital costs for purchasing servers and software licenses, and staff costs to maintain, manage, and keep systems available and updated.



**Increased productivity** of staff by providing them the ability to instantly access infrastructure capacity and new technology, like Data Analytics and AI.



**Increased agility** as cloud vendors make it easy for customers to scale, up or down, both in terms of computing capacity and the rapid and easy provisioning of new employees and locations, in response to changing business objectives, marketplace conditions, opportunities and events.



**Reliability and availability** assured by cloud vendors that are often difficult for individual businesses to achieve on their own in a cost-effective way. AWS offers SLAs that approach the "Holy Grail" of the five 9s – i.e. 99.999% up-time.



**Security**, when implemented correctly, is now generally considered to be as good, or in many cases, far superior to what individual organizations have in place to protect their on-premises systems and data.



**Improved support** for mobility and collaboration.

But while the cloud offers many wonderful benefits, it's also extremely complex. Take, for example, just the single task of evaluating cloud vendor options. If you combine all instance types, storage options, availability zones, and pricing plans from the major cloud vendors, you'll find that there are currently over 25 million cloud configurations available. Given that staggering reality, choosing the optimal configuration for your organization suddenly becomes much more challenging. As if that's not daunting enough, the available configurations (as well as your requirements at any given time) are constantly evolving. Unfortunately, this complexity all too often makes it difficult for companies to experience the performance and cost benefits they're capable of.

When it comes to your cloud, precision equals performance. Making the right cloud decisions on an ongoing basis to consistently achieve optimal performance at the lowest cost isn't easy—or even possible—without having highly precise analytics to guide you, and making the wrong decisions can have disastrous consequences.

The only way to accurately and cost-effectively match your needs to the most suitable cloud configuration and realize the full potential of the cloud is to **adopt a deep analytical approach** – an approach that requires you to consider some 150 specific metrics to ensure you make a choice that supports your organization's business requirements while delivering the maximum ROI.

### **In this paper, you'll learn:**

-  The main stages of an ongoing, strategic cloud journey
-  The primary objectives to achieve and top questions to ask at each stage
-  Which analytics you need at each stage in order to make the best decisions

# Taking Inventory of Cloud Goals From Every Corner of the Business

Before you begin your journey, it's important to take stock of the motivations that triggered a move to the cloud. These originate with questions from teams working in various capacities throughout the enterprise.

## Finance

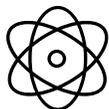
Who recognizes your data center contract is up for renewal and wonders whether a move to the cloud could make your organization more efficient and cost-effective.



Who is alarmed that after migrating from on-premises systems to the cloud, costs are rapidly rising beyond expectations.

## CIO

Who sees millions spent on hardware acquisitions, software licenses and updates, maintenance of on-premise assets, and IT staff.



Who is charged with creating a roadmap for a move to the cloud that specifies what and when to move, what public cloud vendor and cloud configuration will best serve their organization, and has some information, but not the definitive data to justify recommendation(s).

## Director of IT Operations

Whose neck is on the line to make sure IT assets, applications, and critical data are always available to those who need it to operate and grow the business.



Who is wondering how to avoid and/or deal with system failures, improve IT performance across a geographically growing operational footprint, ensure efficient, right-sized provisioning of new locations and employees, but does not have the data to reach those goals.

## IT Manager

Who is constantly diverted from core business activities such as new application development, running business analytics for C-level executives, and other strategic activities because they are called on to troubleshoot on-premises systems, field LOB help requests, ensure connectivity, and provide other services that can be effectively offloaded to a cloud vendor.



# Getting the Most from Your Cloud Is Not a One Time Task

It's an Ongoing, Strategic Journey.

**To ensure the most successful and cost-effective move to the cloud and to keep cloud deployment optimized, organizations need detailed information about their IT infrastructures, as well as additional information regarding the vision and plans for their organizations' ongoing evolution and growth.**

As you consider your move to the cloud, and your short-, mid-, and long-term objectives and expectations, you should employ a continuous, closed loop analytical process in which you gather extensive, up-to-the-minute data and perform analytics on that data. To ensure that your move to the cloud and your chosen cloud configuration are successful – and continue to be so as time passes and circumstances change – you'll be best served by using a process that comprises three recurring phases:



This multi-step process is ongoing and by regularly running through this process, you can maximize the effectiveness and ROI of your cloud deployment to support your organization's strategies and objectives while gaining the ability to respond rapidly to virtually any new situation.



# Assessment

## The Objective

Determine which cloud vendor and which cloud configuration is the best for your organization, and the total cost of ownership (TCO) for moving to the cloud. Cloud configuration includes instance types, storage options, availability zones, pricing plans, and required capacity. Your best-fit configuration will give you the best performance at the lowest cost.

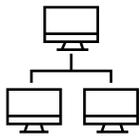
## Requirements

In order to get an accurate assessment, you need a clear picture of your existing infrastructure and applications – what you currently have, your performance profile as well as the nature and quantity of related storage. When that is complete, you will also need a means of performing apples-to-apples comparisons of how various cloud vendor offerings and related pricing models will serve your requirements.

# Essential Data

## Comprehensive Performance Analysis

In the Assessment stage, comprehensive performance metrics and analysis are absolutely essential to choosing the optimal cloud vendor, instances, storage options, and pricing plan, and then accurately predicting cloud costs. These include:



### Inventory Analysis

Identification of all the nodes (physical and virtual machines) and applications running in your infrastructure. You need to be aware of everything you have in order to run an accurate performance analysis.



### Infrastructure Performance Analysis

Undertake an assessment of performance metrics for compute, storage, and network resources. These metrics inform your optimal pricing plan, and also inform, for each of your workloads, the best instance type in the cloud, the best storage options, the required capacity, the network cost, and the cost of migration. Key metrics include:

- Peak CPU Utilization
- Allocated and Peak RAM usage
- Observed Storage On-Premises (capacity and current occupancy)
- Disc IOPS and Bandwidth
- Throughput
- Usage Patterns: identify how often compute and storage resources are on, idle, and unused

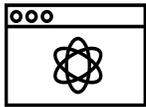


**TIP:** Observe peaks and valleys of all performance metrics, NOT averages. If you size your cloud environment based on averages, your infrastructure will suffer serious performance degradation when you hit peaks, and you will incur unnecessary costs during slow periods.

For one company, using comprehensive performance analysis to identify the optimal configuration for its workloads **saved nearly 40% on annual cloud costs.**

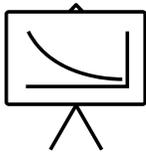
# Cloud Options Analysis

You need to know what your options are and choose the best one based on your performance profile. These include:



## **Available Cloud Configurations**

There are literally millions of potential cloud configurations available, including instance types, storage options, network options, and PaaS services.



## **Available Cloud Cost Models**

AWS offers an on-demand pricing plan and different types of reservation plans. Reserved Instance (RI) plans range from no up-front 1 year to 3 year all up-front RIs and can provide savings from 15% all the way up to 75% on top of on-demand pricing. If you know your performance profile, you will be able to identify the pricing plan that is extremely well-matched to your specific needs, cutting costs significantly.

**Once you've gathered your performance analysis and cloud options, you will want to find matching infrastructure settings in the cloud and test them against your performance goals.** Optimally, you will project workload characteristics on every single available cloud option and see if your performance target is matched. The best practice is to run interactive, what-if scenarios against available cloud configuration options and pricing plans to identify the option that will deliver the performance and ROI you're seeking.

# Common Assessment Pitfalls

## **An Inaccurate View of Your World**

If your organization's CMDB (configuration management database) is not perfectly up-to-date, you are not alone. Given this reality, most organizations face a long and tedious interview process that is rarely accurate. The less accurate your infrastructure analysis, the more likely you will be to break application connections in the cloud migration process. This means suffering performance issues and increased security threats.

## **Workload Misalignment**

Failing to assess your infrastructure performance profile accurately (i.e., overlooking peak usage demands) means you are likely to select an inappropriate or unworkable cloud configuration. This risks cost inefficiencies and poor performance that may even bring critical business systems to a stop.

## **Storage Misalignment**

Disc IOPS and Bandwidth are too often overlooked when selecting a cloud configuration. Every type of disc has limitations for these measures and underestimating your requirements has a crushing impact on performance. What's worse, bottlenecks of this type are hard to find and therefore hard to quickly fix.

## **Questions answered during the assessment leg of your cloud journey should include:**

- What does our total IT infrastructure look like?
- Which cloud vendor and package is best for our organization and goals?
- What are the best instances for each of our workloads?
- Do we have the right amount of storage, and have we chosen the best storage option available for our needs?
- What do our CPU and RAM usage look like over time, specifically accounting for peak and lull periods versus average usage?

# 2

## Migration Planning & Execution

### The Objective

Create a clear plan to guide your migration process from planning to execution that designates which applications you will migrate, and how and when you will migrate them. Your migration plan should include a migration strategy for each application, defining the amount of change you will make to each application as you move them to the cloud. The amount of change will determine your migration velocity -- how fast you can move applications through the migration process, known as the migration factory.

It is important to develop a clear plan and complete some Proof of Concept (POC) migrations before you begin working out kinks in the factory process. The goal is to gain efficiency through repetition.

### Requirements

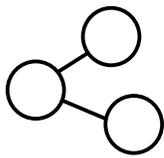
You will need to drill deeply into application dependency details and produce a complete visual mapping of your existing infrastructure and applications and the relationships between them. This will illustrate which applications will be easy to migrate and which will be the most challenging, as well as help you explain why some applications are less suitable for the cloud because they will not perform well in the cloud environment.

Create a Migration Taxonomy that defines which characteristics will determine a migration method. For example, you may decide that all business-critical applications should be replatformed to allow for high availability (HA) or autoscaling and that all non-critical business applications should be retired if possible or rehosted if necessary. This decision matrix taxonomy will be helpful in determining the path of your applications and complexity of your migration.

# Essential Data

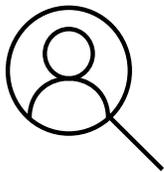
## Migration Design Analysis

Gather the following information to design a phased approach to the cloud that aligns to your business needs and ensures nothing breaks in migration.



### **Application Dependency Mapping**

For all of your applications, determine the other applications and servers they are communicating to, how often they communicate, whether the communication is bi-directional or uni-directional, and what the allowable latency is in communications between each. Map these dependencies in order to understand the complexity of each of your applications. **This is where the inventory analysis you did in the Assessment stage again becomes critical.**



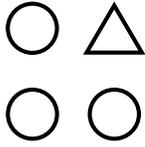
### **Executable Names, Application Names and Descriptions, and Vendor Information**

Identify which applications are running and who built them. For example, which are proprietary applications built internally that may need to be rebuilt in the cloud; how much customization have you done to an “off-the-shelf” application that will need to be replicated for your migration rather than simply solved by purchasing the cloud version of the application; or which might be an out-of-date application no longer supported by the vendor that made it.



### **Application Owner Interviews**

Speak with each application owner to gather qualitative data about the application, its purpose and business impact. This will provide you with information about how the application provides value to the business and how any future plans for it might impact the migration methodology.



### Shadow IT

Hidden nodes can be found by identifying dependencies going to IP addresses within your environment but outside of project scope. It is essential to discover if your applications are talking to these hidden nodes before migration begins. Understanding the scope of shadow IT allows you to create a service catalog and governance model to prevent it.



### Migration Methodology

Evaluate an application's cloud compatibility and determine its most appropriate path to the cloud. **Your migration taxonomy can serve as a decision tree to help you** quickly and uniformly determine the right migration path based on the application profile and its business criticality.

Things to consider include:

- Ability to auto-scale: Auto scaling can also automatically increase the number of cloud instances during demand spikes to maintain performance and decrease capacity during lulls to reduce costs. Determine each application's number of auto-scalable nodes and tendency toward "bursty" behavior (up and down vs. static IOPS/CPU resource demand).
- Whether there are suitable instance types available in the cloud for the application and whether it is proprietary or a specialized version of off-the-shelf software.
- Business purpose and value of the application and whether it is worthwhile to invest in modernization.
- Whether there are SaaS-based delivery models that might be more functional to your business in a cloud-native consumption model.

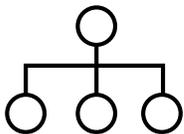
# Migration Execution Analysis

Ensure you have information vital to your migration execution. This includes:



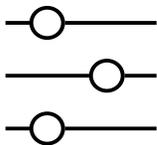
## Firewall Rules

Understand the firewall rules for each application in order to configure your security groups in the cloud. Firewall rules let you know which applications are talking on which ports and which ports you need to open for inbound/outbound application connectivity to work. You also need a detailed understanding of TCP and UDP ports so you can build firewall rules for subnets.



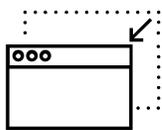
## DNS

Inventory your DNS as it will need to be configured when moving to cloud.



## Cloud Configuration

Leverage the insights gathered in the Assessment stage to migrate each of your workloads to its optimal instance and storage type.



## Migration Windows

Understand the change control process for each application so migrations happen smoothly and with limited interruption to the business.



**TIP: Putting Simple Things First.** Each application will eventually be categorized as easy, medium, or hard, both for migration complexity and suitability for the cloud. Although you may have been trained to tackle your hardest problems first, that is not the case in cloud migration. The less complex and less demanding applications migrate first.

# Common Planning Pitfalls

## **Bad Breaks**

If you don't have details on each of your applications you will inevitably group them incorrectly and migrate them out of phase. This will increase the number of application connection breaks during migration and compound de-bugging issues once in the cloud. By fully planning out your migration and practicing it with a POC migration before finally moving all of your application groups to the cloud, you can avoid lengthy trial and error and reduce migration time.

## **Shadow IT**

If your applications are talking to hidden machines, they must be incorporated into your migration plan. Typically, companies have 15% or more Shadow IT and without identifying these, you'll not only have breakage issues, but also security issues.

## **Running Before you Walk**

The value of a well-informed approach to selecting and executing your pilot applications cannot be overestimated. A failure in the first stage of a major cloud migration effort has technical, psychological and political implications.

## **Questions addressed during the planning leg of your cloud journey should include:**

- Which applications should be migrated to the cloud and in what order?
- How will I determine my migration path for each application and create a standard taxonomy?
- How do we ensure that all relationships between application groups (inside and beyond our environment) remain intact and continue to function correctly from the cloud?
- What licenses do we have and what is the status of each?  
Where do vendor families exist?

# 3

## Application & Platform Modernization

### The Objective

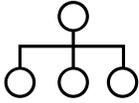
Simply moving legacy applications to cloud platforms without rewriting code or changing their architectures may bring some benefits, but it won't allow you to take advantage of the full value that the cloud can bring. To capitalize on all the benefits of a cloud architecture, you will need to modernize utilization and management of IT infrastructure. Cloud can provide agility—but only if you rearchitect your infrastructure and applications to take advantage of cloud-native services like Database PaaS services, CI/CD pipelines, autoscaling, HA and file caching.

You need a new perspective on IT systems: a cloud prospective.

### Requirements

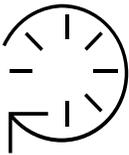
A review of applications and IT processes will provide a window to what a cloud-native world will look like for your organization. As opportunities for optimization and modernization crystallize, you can build a backlog of projects ordered by complexity and business impact. Prioritize the projects that will deliver the most impact with the least amount of effort. To build this list you need to understand the specific requirements of each application alongside your users' needs and the overarching goal: driving business value.

# Essential Insights



## **Organizational Changes**

Organizations must consider implementing modernization strategies that include the adoption of new technologies and architectural patterns coupled with the required organizational changes to enable a more agile software development life cycle (SDLC). This often results in newly formed engineering teams (commonly called DevOps, DevSecOps, or 2 Pizza teams). that are responsible for the entire SDLC, from requirements capture to architecture, build, test, maintenance, and operations.



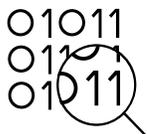
## **Leveraging CI/CD Practices**

Continuous integration/continuous deployment (CI/CD) can be enormously beneficial, better equipping DevOps to release code frequently, securely and reliably. But adopting these practices may be easier said than done. It often requires a checklist of modern engineering approaches and practices to maintain alignment of existing and new IT and development teams. It's also helpful to assign a project manager to ensure a tightly orchestrated transformation process.



## **Automating for Value**

The SDLC can be painfully manual, especially where legacy systems are decades old. Utilizing CI/CD tools can enable automation of significant portions of the SDLC . This enables a more agile engineering team—and can also provide a massive boost to the performance productivity of a software engineering organization/team.



## **Finding the Data that Matters**

Application analytics help developers quickly predict and identify performance issues before they get to the end-user, while monitoring tools help ensure the reliability of services by providing real-time visibility into the health of systems. For the C-suite, application analytics data can help prove the value of the new software features. It also enables the limited testing of new features using methodologies such as A/B testing to justify further investment in new functionality.

# Common Optimization Pitfalls

## **Set It and Forget It**

Once you've migrated your applications to the cloud, you must actively ensure everything is running optimally. This phase can cause you serious problems if you bring a traditional (set it and forget it) mentality of managing infrastructure to the cloud.

## **Bad Surprises**

Inaccurate or insufficient planning causes pain during the migration process and can result in budget overruns during the management phase.

## **Paying for What You Don't Use**

Over-provisioning of services will have you paying for capacity you don't use as will allowing your system to bloat beyond its usefulness. Set limits for how much you should be spending per application.

## **Insights discovered during the optimization leg of your cloud journey:**

- How can we pinpoint our optimal cloud configuration to meet performance targets?
- Cloud configurations are constantly changing. How can we ensure we're keeping up?
- How can we control our cloud costs? Where can we save money?
- How should we plan for future growth and ensure accurate provisioning of my workloads? These – in addition to your requirements – are constantly changing. In fact, the cloud is usually getting cheaper, giving you more opportunities to save on costs.

# Wrapping Up

## A Successful Cloud Journey Depends on a Comprehensive, Analytics-Driven Approach

**Selecting, migrating and managing a cloud implementation on an ongoing basis is complex. As this paper describes, decisions at each stage in your cloud journey require accurate, in-depth data in order to realize the full benefits of the cloud while maximizing your investment. The greater the precision, the greater the ROI.**

Some organizations try to inform their move to the cloud by using the data they are able to gather manually and anecdotally – running reports, producing spreadsheets, interviewing IT colleagues and LOB users, conducting a physical inventory of assets and along the way hoping they don't miss any hidden elements. These tedious and error-prone efforts too often lead to the pitfalls enumerated here and ultimately negative business outcomes.

Fortunately, it's possible to automate this deep analysis employing currently available solutions. Such an approach has been demonstrated to produce not just significant time savings for organizations, but cost savings as well. In addition to tools that analyze one aspect of your cloud journey, automated, multi-phase cloud analytics platforms are designed to gather, analyze critical data, and produce recommendations. These holistic approaches promise a **continuous, closed loop analytical process**, proving to be the most effective and reliable approach to guiding organizations' cloud migrations while ensuring operational and cost efficiencies.

Organizations that have employed a multi-phase, automated, analytics-driven approach to guide their migrations to the cloud have realized **50% cost savings on average**, compared to their prior infrastructure costs, while reducing their planning and migration time by 65% compared to using other approaches.

Our Migration Assessment provides expert insight and tailored guidance to organizations seeking to undertake Cloud Migrations. We will help you define a strategy and business case for cloud adoption as well as carry out a TCO assessment so you fully understand your current application portfolio with granular application dependency mapping.

Learn more about the Cloudreach AWS Migration Assessment by reaching out to our team at [cloudreach.com/contact-us](https://cloudreach.com/contact-us)

# About Cloudreach

Cloudreach is the leading multi-cloud services provider. Our mission is to help companies navigate their unique journeys to the cloud and build new foundations for future growth.

We're a team of cloud natives with over 700 certifications in AWS. We challenge people to do things better, so they can do better things. Businesses that work with Cloudreach adopt cutting edge technologies to solve challenges and create new opportunities. In this way, we deliver unrivaled value for more than 1000 enterprise clients globally.

For more information about our services, visit [cloudreach.com](https://cloudreach.com).

**Cloudreach**<sup>™</sup>

[www.cloudreach.com](https://www.cloudreach.com)