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Realizing the Value of Cloud

SWIFT AND **AGILE**
response to market demand for
CLOUD COMPUTING

People matter, results count.

Leveraging the value of Cloud

Companies are realizing that the Cloud is an inevitable part of their future — not a question of "if" but rather "when," "where," "what extent," and "how". For some companies, it may be a key enabler to reduce IT cost while improving responsiveness to the business. For other companies, it may be niche play, focusing Cloud on pre-production environments or as more cost-effective disaster recovery or backup option. Others would use it, in conjunction with DevOps and Platform-as-a-Service (PaaS) solutions, to enhance IT agility, enabling quicker releases and responsive innovation. And, a bold few may make it an integral part of their business enabling strategic capabilities that disrupt industries; case in point companies include Uber, Airbnb, and Netflix. Regardless of intent, determining what makes sense to move to the Cloud is a key IT imperative today.

Defining the Right Cloud Strategy

Determining the right Cloud strategy entails answering the following questions about an application:

1. Whether it's Cloud-feasible or it stays on premise
2. If it's Cloud feasible—
   – Should it be on a public or private Cloud
   – Which Cloud option makes sense – Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) or Software-as-a-Service (SaaS), makes sense

In answering these questions, there are a multitude of business and technical factors to consider. First, there are factors that help answer the first question and determine if an application is even viable for the Cloud:

- A Tier 1, mission critical, or difficult-to-virtualize application may not be good candidates for the Cloud.
- An application that has a heavy client component or near real-time device integration, is not Cloud-feasible.
- Applications that are close to end-of-life-cycle, lack documentation or access to the source code are not ideal candidates.

Another key factor of Cloud feasibility is the technical compatibility of an application to the technology stack of a public or private Cloud platform. A legacy application that is tightly integrated to OS/400 or an older Solaris version will be cost-prohibitive to migrate to the Cloud, unless a rewrite is warranted.

Also, there are a number of factors to consider that bolsters or diminishes the case for Cloud. Some examples:

- How complex is the application? How many integrations and dependencies does it have? What is the network pattern and latency of these dependencies?
- Does the application have unpredictable demand or transaction volume?
- Will the application require significant change or enhancements in the next 12-18 months?

At the end of this first step, one would have a better sense if an application were Cloud-feasible. Doing this requires a structured, logical approach that does not result in analysis paralysis. The intent of this brief is to describe a proven approach that has been built over experience.

Once the applications are deemed Cloud-feasible, the next step involves determining the correct Cloud pattern: public versus private; IaaS, PaaS and/or SaaS. Consideration factors for private Cloud versus public Cloud include:
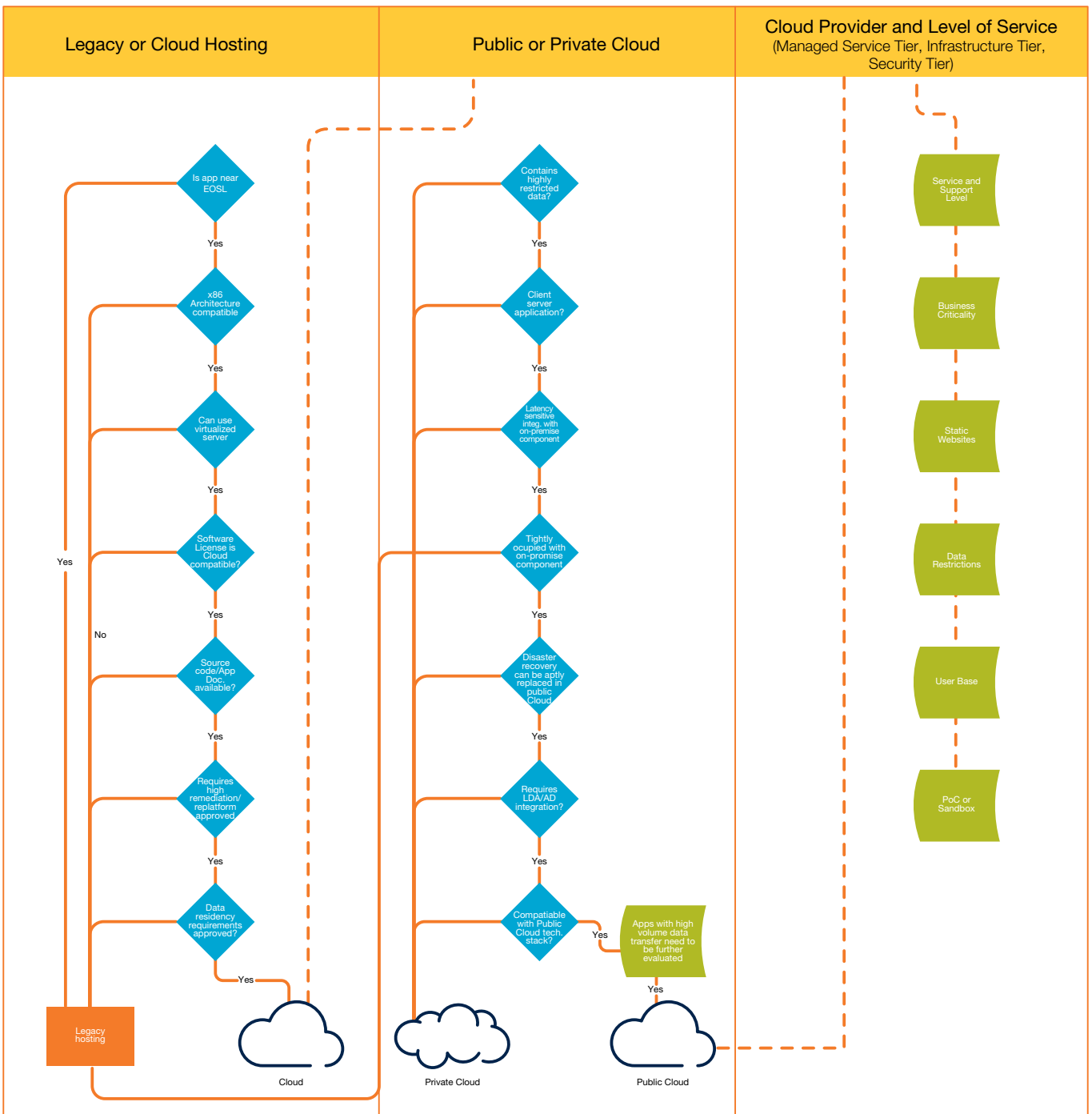
- Data, security, and compliance policy and requirements: a private Cloud can potentially provide a more secure and compliant platform
- Higher performance, availability, or technology stack concerns: a private Cloud enables a company to have more control to design the right hosting platform for an application
- Cost: a public Cloud, being multi-tenant, has economies of scale

Determining the appropriate Cloud option, IaaS, PaaS or SaaS, revolves around the characteristics of the applications and desired business or IT outcomes. If an application is a custom digital asset it can immensely benefit from PaaS. An application that has significant functional gaps and is in an established domain area like CRM, HR, or supply chain, a SaaS solution may be the better play. Or, if application is fairly stable and virtualized, simply re-hosting it on the Cloud, IaaS, makes perfect sense.

There are many factors to think about which can easily result into analysis and paralysis. A recommended approach is to determine which ones are most applicable given the company's intent, the applications to be assessed, and the IT context. Typically this results in looking at a dozen factors.

For instance, a company simplified its decision criteria into a
decision tree:

Figure 1: Cloud Decision Tree

Legacy or Cloud Hosting	Public or Private Cloud	Cloud Provider and Level of Service (Managed Service Tier, Infrastructure Tier, Security Tier)

Legacy or Cloud Hosting column (blue diamonds):
- Is app near EOSL — Yes
- x86 Architecture compatible — Yes
- Can use virtualized server — Yes
- Software License is Cloud compatible? — Yes
- Source code/App Doc. available? — Yes
- Requires high remediation/replatform approved — Yes
- Data residency requirements approved? — Yes
- No
- Legacy hosting
- Cloud

Public or Private Cloud column (blue diamonds):
- Contains highly restricted data? — Yes
- Client server application? — Yes
- Latency sensitive integ. with on-premise component — Yes
- Tightly occupied with on-promise component — Yes
- Disaster recovery can be aptly replaced in public Cloud — Yes
- Requires LDA/AD integration? — Yes
- Compatiable with Public Cloud tech. stack? — Yes
- Apps with high volume data transfer need to be further evaluated — Yes
- Private Cloud
- Public Cloud

Cloud Provider and Level of Service column (green):
- Service and Support Level
- Business Criticality
- Static Websites
- Data Restrictions
- User Base
- PoC or Sandbox

Deciding to Move or Not

Once you've determined an application is Cloud viable, the next step is to determine if it makes sense to make the move. In this regard, a deeper discovery and analysis of the application is needed. More specifically, the following information is required:

- Architecture, configuration, usage profile, metadata
- Integration and dependency mapping
- Data rate of change (gravity)
- OS or app licensing provisions and updates needed
- Privacy, security, and compliance requirements
- Identity and user access management requirements
- Infrastructure requirements — storage, network, disaster recovery, backup, performance, availability
- Financials

With this additional information, the right migration pattern can be determined.
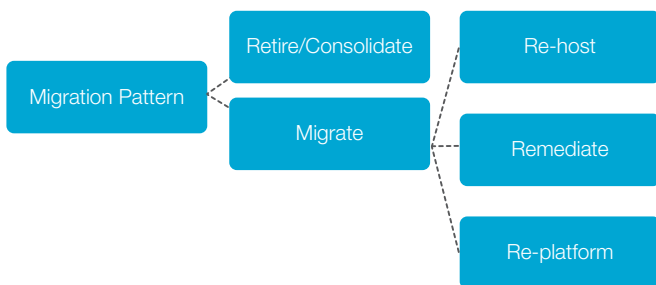
In some instances, applications can be retired and/or consolidated with another application. If migration is the next step, the application may need to be re-hosted, remediated, or re-platformed:

- Re-host: this is most appropriate for applications that are virtualized and has a technology stack that Cloud supports in its entirety
- Remediate: to move and take advantage of the Cloud, the application code and architecture may need to be changed and this can range from low to high degree of change
- Re-platform: this is best when re-architecting and major code re-write are needed to not just move but also optimize ("cloudify") an application to run on the Cloud

Knowing the migration pattern can help gauge the amount of time, effort, and cost to move the application. Having this information, balanced with the potential benefits of the Cloud will provide the business case to move to the Cloud or not. Also, the application lifecycle benefits (e.g. quicker development time) and opportunity costs of not moving to Cloud (e.g. lack of elasticity/scalability and configuration flexibility) need to be considered as well.

Planning the Move to the Cloud with Eyes Wide Open

Migrating a few applications to the Cloud, unless they are highly complex, tends to be a straightforward undertaking. However, when more applications are involved (beyond 30+ applications), logically structuring and sequencing the migration becomes very important. Structuring involves grouping the applications in clusters or tranches. This may be driven by domain area, technology, common dependencies and integration, or balancing complexity and risk. Sequencing the clusters may be defined based on expected return and implementation effort.

As more applications are moved to the Cloud, defining the right architecture and operating model becomes a critical step in the migration plan.

In architecting the Cloud platform, there are three areas to think through. First, is defining and provisioning the right Cloud environment for each application. This requires understanding the hosting requirements of the application thoroughly. It results in defining the key aspects of the Cloud environment including:

- Functional mapping of Cloud platform stack
- Topology pattern
- Data and storage management approach
- Networking approach
- Security, privacy, and compliance design
- Provisioning specifications

Second, is choosing the right Cloud services the applications need. These services may be part of the Cloud platform, user-defined, or open sourced. Typical services include:
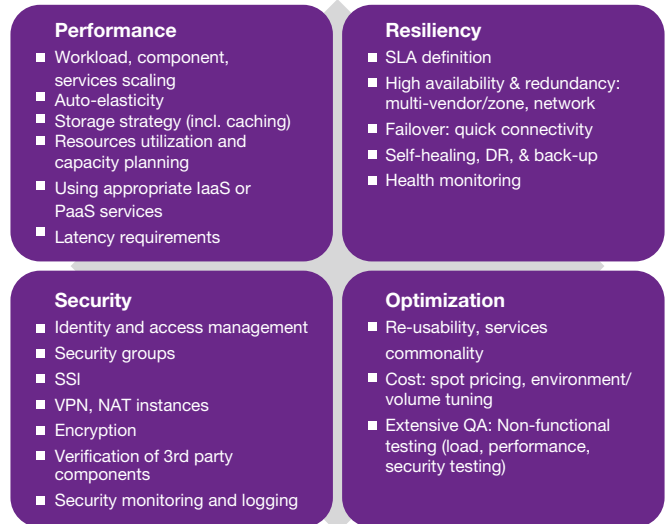
- Identity and access management
- Integration
- Database (mySQL, noSQL)
- Data storage and back-up
- Messaging
- Mobile, media, web, IoT
- HADOOP, Analytics, HPC

Orchestration and brokering these services also needs to be defined so applications can easily identify, bind, ingest, and be managed by the services. Making services "plug and play" will allow flexibility in ensuring best-of-breed services are offered. Having common services across application and workloads is also important to making the Cloud more manageable and supportable.

Third, is ensuring the Cloud environment is well architected overall. In achieving well architected, the diagram below outlines the key areas to think through:
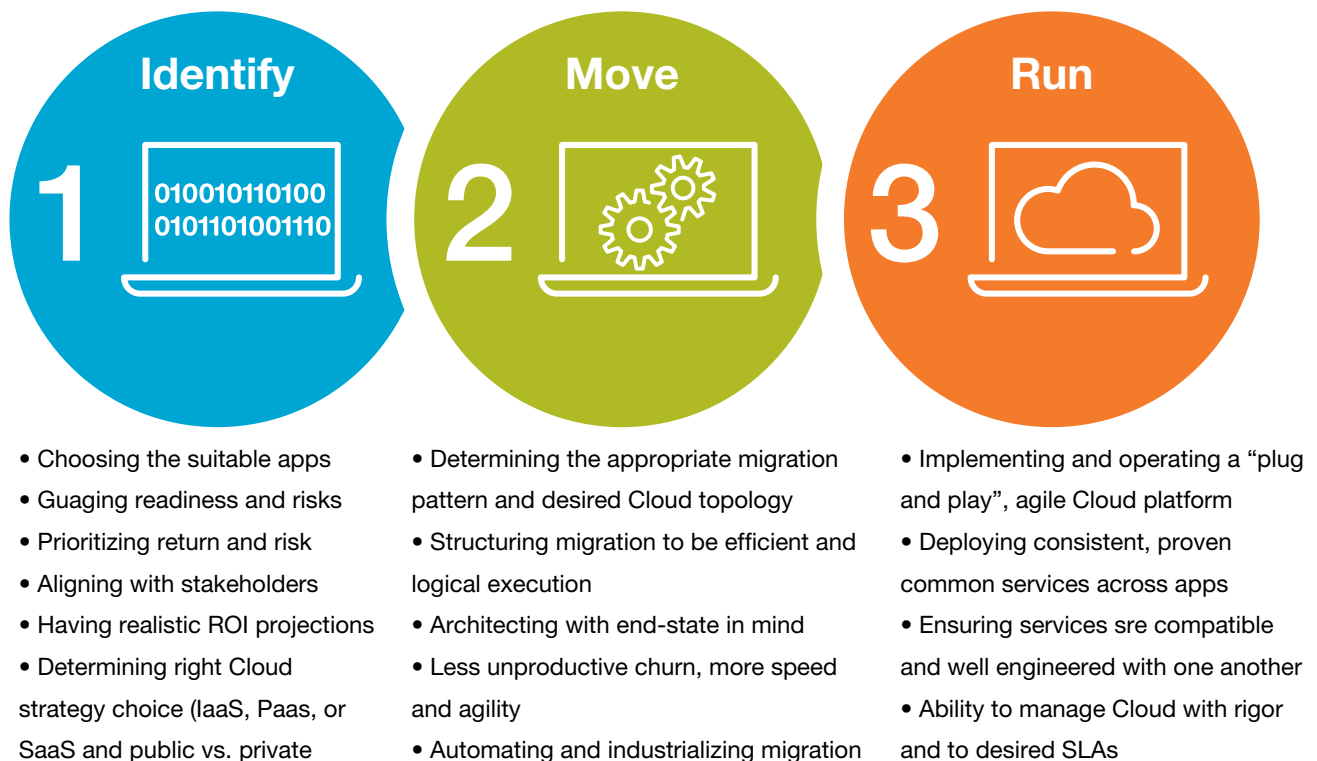
Defining the Cloud operating model entails design of how the applications in the Cloud will be developed, managed, and

supported. With the Cloud and adoption of DevOps, there's significant opportunity to enhance IT agility and quality in developing software. Infrastructure as a code can become a reality using tools like Puppet and Chef. Provisioning and deploying environments can be more automated, reducing responsiveness from weeks to days or even hours. In addition, managing and supporting applications in the Cloud require transformation of ITSM and ALM processes to ensure applications are delivered reliably and securely. New Cloud monitoring tools are needed. IT service catalog has to be updated to include different application deployment patterns and associate Cloud environment images. Provisioning Cloud environment can also be done through self-service. Finally, new Cloud roles may need to be defined and created.

Performance
- Workload, component, services scaling
- Auto-elasticity
- Storage strategy (incl. caching)
- Resources utilization and capacity planning
- Using appropriate IaaS or PaaS services
- Latency requirements

Resiliency
- SLA definition
- High availability & redundancy: multi-vendor/zone, network
- Failover: quick connectivity
- Self-healing, DR, & back-up
- Health monitoring

Security
- Identity and access management
- Security groups
- SSI
- VPN, NAT instances
- Encryption
- Verification of 3rd party components
- Security monitoring and logging

Optimization
- Re-usability, services commonality
- Cost: spot pricing, environment/volume tuning
- Extensive QA: Non-functional testing (load, performance, security testing)

Summary

Moving to the Cloud requires a thoughtful, deliberate, and structured approach.

1 Identify
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- Choosing the suitable apps
- Guaging readiness and risks
- Prioritizing return and risk
- Aligning with stakeholders
- Having realistic ROI projections
- Determining right Cloud strategy choice (IaaS, Paas, or SaaS and public vs. private

2 Move

- Determining the appropriate migration pattern and desired Cloud topology
- Structuring migration to be efficient and logical execution
- Architecting with end-state in mind
- Less unproductive churn, more speed and agility
- Automating and industrializing migration

3 Run

- Implementing and operating a "plug and play", agile Cloud platform
- Deploying consistent, proven common services across apps
- Ensuring services sre compatible and well engineered with one another
- Ability to manage Cloud with rigor and to desired SLAs

Capgemini offers an end-to-end approach in helping companies strategize and plan their move to the Cloud. Our approach starts by determining whether the applications are suitable for the Cloud and if so, what is the appropriate Cloud pattern: private or public, and IaaS, PaaS or SaaS. Next, a deeper application discovery is needed to determine the appropriate migration pattern to an IaaS or PaaS. This will help assess the effort needed and confirm the business case for migrating. Third, a roadmap needs to be defined when a significant number of applications are viable to be migrated. Finally, before executing the migration, appropriate thinking is needed in defining and refining the desired Cloud architecture and operating model.

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