
# Migrating Legacy Application to Cloud

## Leveraging the advantage of cloud computing

# INDEX



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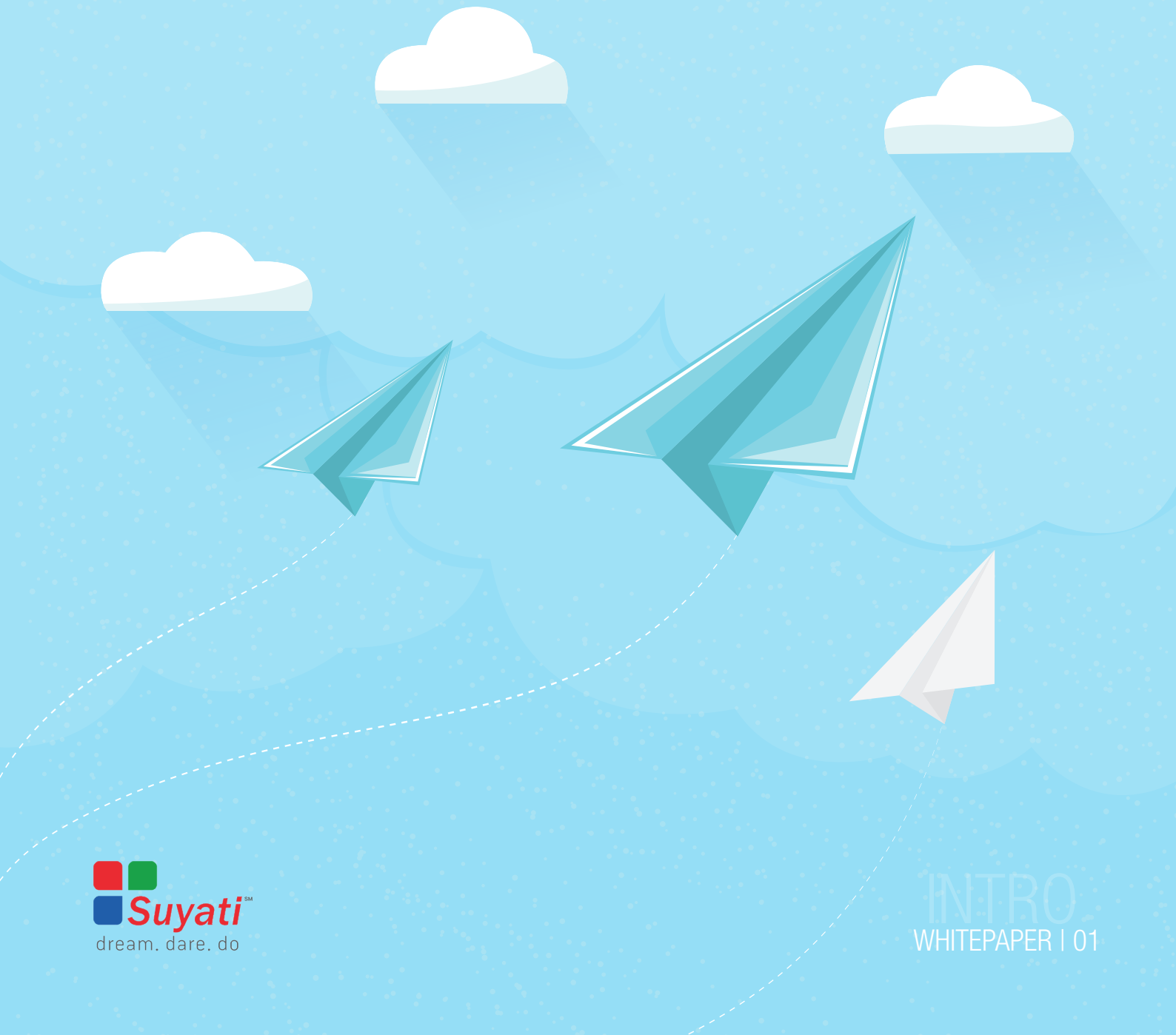
# INTRODUCTION

While cloud computing has become all-pervasive owing to its many inherent advantages, many enterprises, still trapped with their legacy infrastructure, are unable to leverage the advantage it offers. When applications reside on legacy infrastructure, in many cases outdated servers, the enterprise may face many issues related to scalability, resiliency and more.

The obvious solution is migration of such legacy applications to the cloud. Even when application migration does not solve all intrinsic issues related to application scalability or resiliency, enterprises could still derive tangible operational and financial benefits from the move.



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# **Why** Migrate to the Cloud?

There are many good reasons to shift legacy applications to the cloud. Here are a few of them:

01 Cloud based applications can leverage the inherent advantages of the cloud, such as flexibility, scalability, elasticity and more. Users may add or shed resources dynamically, as per their loads and consumptions.

02 The advantages of cloud extend to location independence, high availability, and fault tolerance. Users of cloud based applications enjoy ubiquitous access to services, with ability to access the services from any location using any form factor. Today's businesses are spread over multiple locations, and even if not, today's executives are on the move more than ever before, and would prefer to access information when travelling or from their homes. The cloud makes a perfect complement to support mobile computing. Accessing the application and the connected databases and other resources from the cloud not just makes it easier to retrieve information, but it also improves uptime considerably, spares the enterprise big hassles related to syncing, and improves productivity big time. Operating from the cloud would also make it easy for customers to access the required information.

03 Among the various advantages of the cloud, high uptime and overall reliability stand out. Most major cloud service providers have an uptime of 99.5% and above. Legacy applications running on in-house servers face various disruptions in the form of power outage, hard disk crashes, freak switch off, and other disruptions. Most organizations, hard-pressed as they are in their core operations, find it beyond their capabilities to take precautions against such eventualities. Cloud service providers have various in-built mechanisms such as redundant servers to ensure that such glitches do not come up. In the eventuality of such glitches, the client is virtually insured for losses, depending on the service-level agreements (SLAs) in place.

04 The cloud also offers easy backup and recovery options. Legacy applications require manual backup procedures, which have to be conducted manually. This is often cumbersome, resource intensive, and creates an unnecessary drag on the enterprise. Any cloud provider worth its salt comes with redundant servers residing at multiple

locations, meaning that backup and disaster recovery are integrated to the core process itself, and the client would not have to make any extra effort to recover lost data.

05 The cloud, with its various options such as IaaS (Infrastructure as a Service), PaaS (Platform as a Service), and SaaS (Software as a Service) enable enterprises to deploy their applications without spending either a huge upfront expenditure to set up the infrastructure or any fixed sum to maintain such infrastructure. The cloud offers the pay-as-you-go model, or usage-based pricing, with minimal or no initial costs. Enterprises therefore need to spend only on the actual usage of the infrastructure required to keep the application running.

06 All systems become obsolete over time. The legacy software itself may become very old and the vendor would discontinue support for it. If the application is developed in-house, the people who developed it and were responsible for maintaining it would move on. Or the language it was developed in may die away. Even when the application per se may be working fine, it may be running on outdated hardware that degrades performance, the operating system of the server may have reached its end-of-life and with no support may be a security risk, or there could be several such issues that render the application out of date. In all such eventualities, it makes sense to migrate to the latest technology on offer – which is cloud.

Above all these factors, the cloud represents the future of computing. Microsoft has set a "mobile-first, cloud-first" strategy, which basically gives prominence to cloud over conventional computing, going forward. This strategy is true for the overall industry as well.

# **What** to Migrate?

With the popularity and acceptability of the cloud soaring by the day, most businesses are on the lookout to migrate their legacy applications to the cloud. However, just because cloud computing is the "in" thing and offers many advantages, it doesn't make sense to simply migrate everything to the cloud one fine day.

While the cloud has many unbeatable advantages compared to legacy infrastructure set-ups, at the end of the day, such advantages are generic in nature and need not necessarily apply to the specific application in question. While many legacy applications can leverage at least some of the technology advances inherent in infrastructure-as-a-service, the fact remains that not all legacy applications can thrive or even survive in the cloud.

The decision to migrate a specific application to the cloud depends on:

- Whether it is technically possible to effect the migration
- Whether it makes business sense to migrate

Both these factors are often interlinked.

Most large organizations have hybrid computing environments. This is the result of accumulations over time: co-opting the systems of the companies it has acquired, having developed customized off-the-shelf applications, developing homegrown applications when the standard package deployed was found inadequate, and so on. Such a hodgepodge of applications, platforms, and technology may resemble a mess for a neutral third-party external observer, but for the company, it may get the job done perfectly fine, it is proven as stable, and more importantly, people may have got well attuned to the system.

The biggest risk of migrating such a legacy system to the cloud is disrupting this complex ecosystem. Even if the enterprise somehow finds the time and expertise to make such a shift overnight, there is the problem of resources. Resources come finite even for the biggest enterprise, and in any case has opportunity costs. Conversion to the cloud is costly, in time, effort, and money and businesses would always have other uses for such resources.

Companies having made a decision to migrate are faced with the question of whether to import the existing environment - which may be working perfectly fine - to a cloud-based platform or to spend the available resources to develop new applications with new ideas, hoping to better things.

If the business is well served by the existing ecosystem - legacy or otherwise, then it requires a very compelling reason to make a change, more than just "everybody else is doing it". If a decision to migrate is to tap to the inherent advantages of the cloud, then there has to be a strong business plan on how exactly to milk the advantages through the new application, and the expected ROI from the migration.

The following applications are prime candidates for migration:

- Applications requiring user-authentications: Migrations to cloud applications that authenticate user credentials before allowing them to log-in or conduct any transaction would not just make such apps more robust and secure; they would also allow access from anywhere. Authenticating users, especially remote users, from legacy servers is inefficient and at times, not even possible.

- Applications with real-time notifications: The cloud makes it easy and seamless to push real-time notifications to apps.

- Big Data: Applications primed for Big Data are better off in the cloud, for such apps can easily leverage the cloud's scalability when it comes to storage and processing power. Legacy servers very often create a drag and would require costly upgrades to handle vast quantum of data.

# **How** to Migrate?

On a macro-perspective, the best approach for most organizations is to migrate applications gradually, over an extended period of time, maybe even three to five years. As the business evolves, it will undoubtedly deploy new applications, and it makes sense to house these in the cloud. Side by side, businesses could migrate specific legacy applications on a priority basis - for instance, a legacy application that runs only on a very old version of an operating system, an application that runs on obsolete hardware, or an application whose license support all prime candidates for migration.

On a micro level, migrating the legacy application would in most cases require a re-architecture of the legacy application. While it may be technically possible to pick up the individual application and copy it to a cloud based server, such a move would not necessarily offer all the benefits of the cloud, especially resiliency, agility and predictability.

It is important to make the following considerations for a smooth transition:

## 01 Chose the Model: SaaS or PaaS or IaaS

It is important to decide upfront on the cloud model to adopt—SaaS, PaaS, or IaaS. The Software as a Service (SaaS) model is more of a replacement of the legacy application rather than migration of the existing legacy application. The migration is limited to old data, with the code in most cases rewritten using the same or new logic, for compatibility with the cloud. The advantage of SaaS is its pure pay-as-you-go nature, with the service provider taking care of both the application and the infrastructure on which the application runs.

The Platform as a Service (PaaS) model entails shifting the existing legacy application from wherever it is located the in-house servers in most cases—to a standard (and in many cases shared) cloud based application server software such as the Microsoft's .NET platform or Java EE 5 platform. In many cases, the legacy application may be ported as it is, but some PaaS environments do not support all features of the application server; in such cases it becomes necessary to make changes in the application.

In PaaS, the service provider manages the application platform software, decides how the application platform is mapped to the physical infrastructure, and usually offers the enterprise access to common application services such as SQL databases. The enterprise still remains responsible for the actual software.

The Infrastructure as a Service (IaaS) model entails moving the application to the cloud service provider's servers. This works when the cloud-based server hardware and operating system are compatible with the current server's hardware and operating system. For instance, an application is running on an x86 server may be moved to the cloud servers if the cloud server is also able to implement x86 instructions. If the hardware is not compatible, it becomes necessary to recompile or redeploy the application for the new platform.

The decision on which cloud model to adopt depends on a host of factors, such as:

- Service Level Agreements (SLA) related to overall availability, scalability, and performance, as well as on application maintenance and upgrades
- Data portability or the extent to which organizations may control their own application data
- Long-term costs
- User management
- Security

Unless these factors are evaluated carefully relative to the business and the best model selected, migration to the cloud would create more problems than it would solve.

## 02 Decide on Private, Public or Hybrid Cloud

The advanced enterprise-grade capabilities and services offered by the cloud service provider often come at the cost of security, as public cloud servers are shared. Not every application is suitable for migration to a public cloud, and the following are some situations that make migrating to the public cloud a bad idea:

- Security and Accessibility Risks: Apart from the obvious security risks that come from sharing resources such as data center storage and directory services, there are implications of losing control of critical data to unknown third-persons.

- WAN traffic: Migration to a public cloud is a bad idea when the application workload is traffic intensive, and when the application communicates with other data center resources or applications. This is owing to high WAN bandwidth costs and potential performance effects that such migration would bring in.

- Legacy application integration: When legacy applications remain tightly integrated with other applications and platforms running in the enterprise, then migrating the application to the public cloud may not only sap performance, but also place such platforms at risk. Applications dependent on the other legacy applications and sensitive to security are best migrated to a private cloud, where the enterprise has direct influence over the infrastructure architecture and operational policies. There is the option of hybrid cloud as well, which tries to reconcile between the two options. All these options, however, come at a price.

Private cloud obviously comes at a price, which may be unaffordable to many organizations. It also lacks scalability. Secure hybrid cloud, the collaboration of a public and private cloud provider platform, very often offers the best of both worlds. The public and private cloud infrastructures function separately, with the hybrid technology allowing for porting of data and applications over encrypted connections.

## 03 Undertake Application Profiling

When migrating existing applications to the cloud, it is critical to examine the unique needs of pre-cloud workloads. For this, it is important to undertake application profiling, or measure and collect real usage data of an application before the actual migration. The key data collected as part of this exercise usually include:

- CPU usage
- Memory usage
- Throughput, latency, and input/output operations per second and other storage related data
- Network related data such as throughput, connections per second and dropped connections

Such node-level data helps to size the application deployment in the cloud and make appropriate provisions. It also makes explicit the types of machines and how many machines would be required for the application to run seamless on the cloud.

## 04 Profile User Activity

In addition to node-level statistics, it is also important to profile user activity, such as the total number of connected users, request and transaction rates, and request latencies. This helps in making appropriate provisioning, to maintain or improve service standards post-migration. The node data and user data together also offers a good estimate of the actual costs the migration would entail.

## 05 Affect the Actual Transfer

The actual transfer of the selected application to whatever cloud architecture that is decided upon requires much coordination across the enterprise. The process requires staging the new environment before the actual cutover.

The process of migration depends largely on the application architecture and business requirements. Most enterprise applications have multiple tiers with well-defined interfaces between the tiers. These tiers decouple the major functions and modules in the system. A common approach is organizing the application into three tiers:

- Data management tier, containing of relational or other database components
- Business logic tier, with the application platform such as Java EE or Microsoft's .NET
- Presentation tier, which link the user interfaces

For well-defined interfaces between layers, applications use a layered architecture approach. To separately migrate application tiers or modules within a tier, it is necessary to analyze the application usage patterns.

Application tiers might also have varying security and zoning requirements that would require different configuration set-ups. For example, it might be necessary to secure some application data behind a firewall.

The actual migration may also be done in one block, or in stages. When downtime is not acceptable, it is best to migrate in phases, and keep both the legacy version and cloud based version running simultaneously until the cloud version stabilizes and glitches are ironed out.

# Readymade Solutions

Considering the pressing need for businesses to migrate their legacy applications, several vendors now offer readymade solutions that make the task of porting legacy apps to cloud based platforms easy, and even automate the process to a large extent. WebMAP2, for instance, deploys algorithms that separate business logic from user interface code, to convert business logic to native C# on ASP.NET, and migrate user interface code to HTML5 with JavaScript. Microsoft's Web app architectural pattern—Model-View-View-Model (MV-VM)—keeps the UI and business logic in sync. The code thus generated is fully native to the target platform.

Such ready-made solutions, however, may not be suitable for all enterprises and all applications. Businesses need to evaluate each solution on its merit and reconcile the same with their business needs.

Most organizations realize the benefits of migrating legacy applications to the cloud, but many falter when they actually start to do so. The complexity of computing architectures, concerns about security, stability and performance, and the risk of the change disrupting the stable business ecosystems are all real concerns that need to be addressed through a well thought out strategy and robust blueprint that makes the migration seamless.

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We offer several ready-to-use cloud based solutions. Voraka is a unique cloud based writer-management tool, making it easy for content curators to manage writers and their deliverables. SoCXO is another cloud based solution, offering enterprises a brand advocacy platform, to help them identify brand advocates and enabling such advocates to share content and become storytellers over the social media.

www.suyati.com services@suyati.com

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