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WHITEPAPER

# THE DEFINITIVE GUIDE TO CLOUD MIGRATION

A step-by-step roadmap to choosing the right cloud environment, creating a high-performing cloud migration strategy and executing the project.

Detailed Azure migration case study included.



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Executive Summary

## Executive Summary



The cloud and the post-adoption silver lining are hard to ignore. By 2018, the cloud has entered the mature state and rapidly becomes the "business as usual" operating model for competitive enterprises.

This whitepaper is intended as a comprehensive outline for enterprises exploring the possibility of cloud migration and those at the stage of finalizing the "cloudification" decisions. It summarizes the primal benefits of the cloud, compares the different types of cloud environments and guides you towards choosing the optimal cloud operational model for your business. Additionally, we offer a comparison of the key public cloud service providers (Microsoft Azure, Amazon Web Services, Google Cloud Platform and IBM Cloud) and outline the pros and cons of using each provider.

This is also an action paper as it delivers a six-step framework for outlining your cloud migration strategy and bringing it to life.

This section also includes an overview of the common cloud migration challenges and suggests actionable ways to eliminate those.

Finally, the paper also includes a detailed case study of a multi-step cloud migration project executed by the Infopluse team for an enterprise IT service provider. Upon reviewing it, you will develop a better understanding of the optimal technology stack you will need; learn more about the benefits of the hybrid cloud adoption, laaS and SaaS migration.





# The Definite Benefits of the Cloud



As you probably know, enterprises and mid-to-small business are dialing up their investments in the cloud technology.

If you are still at the decision-making stage, give the following benefits some consideration:

### **Accelerated Application Delivery**

Cloud computing drastically speeds up IT provisioning cycles, as there's no associated waiting time to access/allocate the infrastructure. By embracing continuous delivery and cloud DevOps, your company can ultimately reach the next results:

• 20%+ faster time to market for new services.

• 50% less application failures and faster recovery time (in 10 minutes or less).

• 30% more frequent new code deployments and a 38% improvement in overall code quality.

### The Definite Benefits of the Cloud

### **Measured service**

You pay only for the resources you consume e.g. gigabytes of storage, CPU cycles or any other indicator being measured. You don't need to pay for "dormant" infrastructure that is currently not in usage.

### Rapid elasticity

The cloud capacity can expand or contract depending on your current needs. You will only pay extra whenever those needs increase.

### Market and Capabilities Expansion

Moving applications to the cloud enables you to reach new geographies and new markets without investing heavily in local IT infrastructure. Your legacy desktop products could be revamped as SaaS applications and delivered to users at any location.



### The Definite Benefits of the Cloud



### **Protect Critical Data**

Public cloud security may have earned negative media coverage, but the truth is - cloud applications can boast the same or higher SLA levels when compared to traditional data centers.

### Access to an unlimited pool of resources

Critical data will remain accessible at all times. You can reduce the downtime to less than 9 hours of downtime per year. Considering that a day of downtime can cost a business between \$50,000-\$100,000 on average, that's a significant saving.

### The cloud could be used as a DR location for both on-prem. and virtual applications

This is a cost-efficient option for warm DR scenarios, as you will only pay for storage that is in use. Up 90% of IT users feel confident in the cloud-based DR solution, compared to

74% confidence in on-premises DR plan only. Additionally, 34% agree that a cloud DR is simpler to deploy.

Once cloud services are integrated, you can upgrade and downgrade them as needed without the cloud service provider being involved. Meaning, you can account for new users, virtual machines or services at any time, with changes taking place instantly.

### **Broad network access**

The cloud can be accessed over the Internet from any device, as opposed to using private connections for accessing an on-premises solution.

### **On-demand self-service**



On-premises Solutions vs. the Cloud: Side-by-Side Comparison

## On-premises Solutions vs. the Cloud: Side-by-Side Comparison



### Flexibility

**Cloud** offers more "operational agility", meaning that you can upgrade the cloud capacity as needed depending on the current bandwidth demands. Scaling can occur both ways - up and down almost immediately.

**On-premises solutions** can be scaled as long as you have the budgets. Scaling costs are much higher and obviously occur at a slower pace.

### **Disaster Recovery**

**Cloud** service providers often have inbuilt recovery and backup systems in place, which helps business avoid significant up-front investments.

**On-premises solutions** come with higher CAPEX and OPEX costs accounting for data centers and storage, backup, archival and retrieval tools. Often, it is challenging to verify DR plans and implement a single DR across the entire organization.

**Cloud solutions** do come with 24/7 monitoring, however, you may need to customize the setting based on your needs to be notified of important events in a timely manner.

### Security

Cloud security is discussed at length with a plethora of opponents on both sides of the questions. Most service providers have in-built security mechanisms, however, you will need to fine-tune those to match your architecture and create a list of security best practices that would be reverently followed. How secure is the cloud massively depends on the configurations you set and the guidelines you follow to prevent unauthorized access.

### Support and Monitoring

**On-premises systems** can be monitored 24/7; however, having support staff accessible at all times can be costly.

**On-premises systems** are harder to crack from the inside (as you know your people), yet inhouse data centers can be prone to external hazards such as power loss, extreme weather conditions, and other unforeseen events.

### Compliance

Cloud providers invest largely in meeting all the compliance provisions as their business reputation depends on it.

**On-premises infrastructure** assumes that you are responsible for ensuring compliance with all the regulations and laws, which apply to your business.

### SLA

Cloud service providers will compensate you for any possible downtime and offer financially backed SLAs.

When things go awry with on-premises infrastructure, you are responsible for getting back on track as fast as possible. This often assumes additional significant costs.

### Customization

**Cloud services** assume multiple configuration options to match your business needs, yet you may hit the ceiling with what you can do at some point and certain providers may not support the options you need.

**On-premises systems** can be tuned as you please after deployment. Your options are limited by the expertise of the in-house specialists.

### Costs

The initial **cloud migration** costs may seem intimidating, however, in the long run, you pay less as there are no equipment costs involved, no salaried engineers to account for and you pay a subscription plan based on the current demand.

**On-prem systems** assume that you need to purchase hardware, account for its operational costs (maintenance, replacement etc.) and pay for supporting staff.



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Clouds vary in shape and capabilities. Choosing the optimal environment for migrating your applications is crucial for further success. This section offers a detailed overview of all the options at hand.

### **Private Cloud**

A private cloud is your exclusive virtual infrastructure. It is provisioned for usage by a single company, yet multiple business users (consumers). This is the top choice for organizations that want to take advantage of the cloud architecture without giving up the control over having a private data center. Private clouds can be hosted both on and off premises.

### Within the private cloud, there exist three other cloud subtypes:

Software-only solutions are an organic extension of your existing hardware. It automates resources supply; manages access to the infrastructure resources and monitors usage. These clouds can be built atop of VMware infrastructure.

For a lot of companies, this is the easiest route for cloud adoption as it offers them a relatively simple and fast path towards adopting cloud architecture.

others.

Examples of software-only private clouds providers: CA Technologies, Cisco, Dell, Egenera, EMC, HotLink, Hewlett Packard Enterprise, IBM, Joyent etc.

**Pre-integrated converged systems** stand for a combined bundle of hardware and software packages, which includes:

 Converged infrastructure hardware stack with compute, network and storage resources.

 Management software with automation capabilities.

Examples of pre-integrated converged system providers: BMC, Cisco, CSC, Dell, EMC, Hitachi, Hewlett Packard Enterprise, IBM, Microsoft, and

Managed Private Cloud system also assumes purchasing a hardware/software bundle from a vendor. The solution will be allocated on your premises, however, the vendor manages it. Specifically, the vendor will provide maintenance, support, upgrades and even remote management if needed. That's an ideal option for companies without the in-house expertise.

Examples of managed private cloud vendors: Citrix, Cisco, CSC, Dell, EMC, HP, IBM, Mirantis, Rackspace.

### The Private Cloud is the optimal choice for:

- Companies with strict security, data privacy and latency levels in place.
- Business in highly regulated niches that should comply with specific governmental requirements.
- Enterprises who have already heavily invested in onsite hardware and wish to improve their resources management. Virtualization can drastically increase the value of your hardware and improve the storage cost efficiency.

- Securely hosting critical data and applications for internal use.
- Organizations that have resources (human & capital) for supporting an in-house data center.
- Hosting applications with predictable usage patterns; and those that command low storage costs.
- Building better protection against disasters by combing virtual servers with SAN (storage area network).
- Obtaining hot-key access to the filesystem (for instance, if you are a media company).
- Organizations who want to stay in full control, yet still benefit from the superior performance, flexibility, and customization.

### Possible Disadvantages of the Private Cloud

- Substantial investments will be required to assemble and maintain the cloud data center in-house. Account for the recurring personnel and upgrade costs.
- Limited capacity. Provisioning additional resources will require purchasing new

hardware and will not happen immediately as it is with the public cloud.

• On the other side of the spectrum is underutilization of available resources.

 Possible vendor lock-in if your company chooses to outsource infrastructure or hardware.

### Public Cloud

The general public could use this type of cloud infrastructure. You share computing resources with other tenants, yet your data remains isolated from the "neighbors". A public cloud may be owned and managed by any type of organization, yet the cloud exists on the premises of the cloud provider.

Examples: Amazon Elastic Compute Cloud (EC2) and Amazon Web Services (AWS), IBM's Blue Cloud and Sun Cloud, Windows Azure Services Platform and Google AppEngine.

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### The Public Cloud is best for:

- Storing non-critical data and data archival.
- Making it as part of your disaster recovery plan to backup data.
- Creating an auto-scaling environment for larger application with shifting usage patterns and/or those occupying a lot of storage space.
- Hosting applications or certain parts of your applications.
- Storing mission critical and latency intolerant web triers.
- Eliminating costly maintenance and hardware upgrade fees.
- Leveraging latest technology. Cloud vendors regularly add new features and foster innovation within the solutions to stay competitive. Doing the same privately will require extensive investment and a dedicated team.
- Onboarding and setting up the cloud environment takes a few hours.

### Possible Disadvantages of the Public Cloud

- Performance varies and depends on your network connectivity.
- Few (if any) customization is possible.
- Obviously, your organization exercise less control over the public cloud and has to abide by the provisions commanded by the provider.
- Resources availability can be hampered as the provider is experiencing an outage or failed to properly distribute the shared resources.
- Regulation-protected data may not be applicable for storing in the public cloud.

### Hybrid Cloud

Hybrid cloud solutions take the better of two worlds, meaning your cloud environment consists of a private cloud section or onpremises solution and a public cloud section with mediation between these two platforms.

Here's an example to illustrate the point. Your company is conducting big data analysis to



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improve customer experience. To save on-prem. storage, you can use a private or hybrid cloud to keep all the accumulated business data and deploy analytical queries in the public cloud.

In this case, you don't need to scale onpremises systems to support distributed computing tasks.

### The Hybrid Cloud is best for:

• Avoiding a costly vendor lock-in. Considering that all your assets are distributed among different vendors, switching to another PaaS or IaaS provider will be simpler.

 Achieving higher resiliency: If you have already researched different cloud vendors, you know that each one has its strengths and draws. A multi-cloud strategy allows you to grab the best features from each vendor and align them with your business needs. Similarly, if you need to allocate additional resources for a certain process (e.g. automated testing for the new product features), you can add a supplementary cloud to ensure higher resiliency.

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- Better security and policy compliance. You can store sensitive information in a distributed fashion to ensure you are meeting all the governmental compliances (e.g. related to storing private customer data); regulations of your company and those of a cloud provider itself.
- Costs optimization. Each vendor has different pricing models. By conducting a performance analysis of your current workloads (cloud and on-prem.), you can project the TCO and workload performance in each cloud and identify the most beneficial combinations in terms of cost/value. Don't forget that an existing data center can be turned into a private cloud too.
- Developing robust cloud infrastructure. Choosing to use cloud vendors in different regions can help you ensure that your applications will always be up and running despite the local outages in a certain data center/cloud provider.

### Possible Disadvantages of the Hybrid Cloud

- You will have to pay special attention to data and application integrations to make sure everything is well-synced and functioning properly.
- Compatibility may be an issue when assembling your cloud, thus limiting the selection of public cloud service providers.
- Fine-tuning bandwidth usage, so that certain applications did not bottleneck others.
- Hybrid cloud creates a complex networking environment that should be properly managed.



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# The Main Cloud Service Providers: An Overview

### The Main Cloud Service Providers: An Overview



Now that you have learned about the different cloud environments, it is time to take a look at the major cloud service providers and to choose one that will meet your specific needs. What follows is an overview of the four most prominent providers, so that you may make a more informed choice.

### Amazon Web Services (AWS)

In terms of infrastructure as a service (laaS), AWS gives organizations extensive computing resources. It was the first of the major cloud service providers, and its strength lies in supporting a lot of users. Companies such as Netflix use AWS EC2 to provide their services to people across the planet.

### Pros

 Pricing plans are built based upon actual usage, rather than a set monthly fee. This is attractive to smaller organizations, especially before they scale.

• Storage is customizable, something that not all platforms provide, and the cost is based on amount and type of storage.

Support fees are variable too and are tied to monthly usage. Again, this is a good feature for organizations that do not anticipate lots of support needs.

 AWS does offer lots of flexibility and customization and supports third-party integrations. It's a good platform for hosting Linux.

Scalability to support huge numbers of users is a plus – probably one of the reasons Netflix has chosen this platform.

### Cons

• There is a learning curve with AWS.

• The pay-as-you-go features of AWS can bring costs up pretty quickly as an organization scales or as tech support needs increase.

AWS probably holds the edge for organizations with web-scale applications that must support a lot of users. If you are looking for a platform

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that is feature-rich and highly scalable, once you become comfortable with it, AWS is a good choice. And, it continues to offer new features and updates in an attempt to attract more customers.

### **Microsoft Azure**

For smaller organizations that want to use cloud servers as replacements for their local hardware/machines, and are not anticipating highly scalable apps, Azure offers a solid alternative to other platforms.

### Pros

- Azure is a much more user-friendly out-ofthe-box solution.
- Integration of Azure VM's with other Microsoft products makes migration pretty smooth.
- Variety of pricing allows organizations of all sizes to choose this platform. And storage costs are fixed based upon amount.
- The other plus in terms of cost is that

Microsoft rounds usage up to the nearest minute, while many others round up to the nearest hour.

• There are a variety of tech support plans, each with a fixed monthly cost, rather than variable pricing. Organizations know up front what they will be paying.

### Cons

- For organizations that intend to scale quickly and support a huge number of users, Azure may not be the best choice.
- Azure is not as feature-rich and customizable as some other platforms.

Azure offers an easy out-of-the-box for Microsoft admins and is a great solution for organizations that want to migrate their VM's to the cloud and that do not anticipate needing lots of customization, special features, of rapid/large scaling.

### **Google Cloud Platform**

Google offers a full array of products/services to

organizations of any size and needs. Among its provisions of computing, storage, networking, and big data/machine learning, it has options to appeal to a wide variety of organizations. Its biggest strength probably lies in data management, so if you have data-intensive applications, Google may be the best choice.

### Pros

- Very strong in the areas of data analytics and storage segment.
- Seamless integration with other Google services.
- Sustained-use option does not require an upfront payment, such as Amazon RI's.

### Cons

- Most features are based only on Google technologies.
- Programming languages' usage is limited, especially Java.

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• Rapid Input/Output = less access time.

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## The Main Cloud Service Providers: An Overview

- It's difficult to migrate out of the platform if a change is desired.
- Organizations that need data analytics and machine learning features will like Google Cloud. And any organization looking to launch IoT devices/products will find this platform really attractive.

### **IBM Cloud**

IBM has the name and the reputation, something that attracts organizations to its Smart Cloud services – IaaS, SaaS, and PaaS. It makes all of these available through public, private, or hybrid models. It promotes its complete hosting and server solutions for any kind of business.

### Pros

- Customers can build and scale private or hybrid delivery models, and support will walk you everything until you are ready to write your code.
- It provides exceptional security.



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### The Main Cloud Service Providers: An Overview



- There are plenty of options and pricing plans.
- It supports a host of programming languages.
- It is relatively user-friendly.

### Cons

- With so many features, it may be difficult to learn which will be the most useful.
- It can be a bit "buggy" and support is needed to work those out.
- There is not much interfacing outside of the IBM environment/ecosystem.

Businesses of any size will find IBM solutions that will meet their needs, especially as they deploy new applications. Migration and set up is not as easy as other platforms, but, once in place, it is fully customizable. Support is also readily available.

Migrating to the cloud is a big step but it can be a powerful solution for VM's, storage, for computing and data management. It releases your own systems from the heavy lifting that would require additional

hardware. Anyone of these four top platform providers has much to offer. It is a question of determining your needs and then making a selection. One suggestion that many have is to take the free trials that are offered and run your own "testing."

And if the cost of using laaS is a big concern, you can use cloud calculators online that can help estimate how much you'll spend each month so you know what you're getting into:

 Amazon Web Services (AWS) Total Cost of Ownership (TCO) Calculator

Google Cloud Platform Pricing Calculator

Microsoft Azure Pricing Calculator

IBM Bluemix calculator



# Undertaking Cloud Migration

### Undertaking Cloud Migration



Once you have built a solid business case for cloud migration and received a buy-in from the team, it's time to get practical. The question is – where exactly do you start?

While each organization will have a unique path to cloud adoption, it will still benefit from having a structured framework that covers the essential steps during the transformational stage.

This section will deliver just that and walk you through the common problems enterprises face during the migration stage and help you work out a custom framework for your project.

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# Understanding Why Cloud Migration Fails

## Understanding Why Cloud Migration Fails



When you aim for the cloud, account for a possible thunderstorm. Moving enterprise applications to the virtual environment has already proved to be turbulent for a number of businesses. Most companies struggled with the next issues:

Lack of Solid Business Case: Cloud migration only makes sense when it can bring tangible benefits your business. Start building up your case by

aligning the possible cloud migration benefits with your current business goals. Here's a series of sample questions to help you define your case:

- Will investing in cloud DevOps help me reduce the deployment time for new features? How may this impact the team productivity and revenues?
- Does it make more sense investing in an onpremises infrastructure when expanding to the new market or opt for the cloud? Are the costs comparable?

transition strategy will be measured? Do you have specific KPIs set? Lack of a Cloud Operating Model. This term describes the ways of how the cloud will transform your current workflows, internal processes and business operations in general. The cloud operating model should be based on your business objectives for migration and define the how your

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• What are the possible pros and cons of migration and how the success of your cloud

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organization will evolve and function after the migration is accomplished. Specifically, it should account for everything that will be transformed by the successful adoption of the cloud.

When establishing a cloud operating model, you should address the next areas:

- Infrastructure Management: You will need to map out how and what cloud infrastructure will be deployed instead of legacy systems. Account for different concerns around managing the OS and middleware such as databases and application servers.
- Application Management: You will need to re-define the application deployment mechanisms, backups, scaling, testing security and so on. By layering down the new operational principles early on, you can ensure smoother cloud adoption in the long shot.
- **The People:** You will likely need to hire new teams such as DevOps and cloud architects and ensure that respective training will be delivered to your current staff.
- **Support:** The cloud vendor will manage most

of the support functions, however, you will need to clearly identify those and make sure they put in writing within the SLA. To patch the remaining holes, you may need to have an in-house team as well.

- Security: Before moving sensitive business data from a private data center to the cloud, you will need to ensure that respective data sovereignty and data classification levels are maintained. Additionally, you may want to fine-tune the default security settings offered by the cloud vendor.
- Financials: Understand how the operational costs will change after migration and create a plan for how those will be controlled and reported. Also, create a plan for optimizing those costs in the long run.



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### Understanding Why Cloud Migration Fails



Underestimated Budgets and Timeline. While the exact number may be tough to calculate initially, you can make an educated guess by applying the next formula:

- A simple "lift & shift" cloud migration project will require 2 or 3 developers and DBAs to port your code and data and 2-3 days time. "Multiply that by 100, subtract the time improvements as you learn, and you'll get 100 workloads into the public cloud in about 200 days, give or take a week," - Linthicum points out.
- Replatforming or re-architecting the application to make it cloud-native will certainly take more time. The timescale will largely depend on what percent of the application needs to be refactored. Linthicum suggests giving one week per each 10% so that 30% of refactoring stands for 3-weeks and so on.

Moving All Process at Once. Cloud migration should not happen avalanche-style. Build your cloud infrastructure one step at a time. Conduct a strategic portfolio analysis (keeping your key

Lack of Testing. Your cloud architecture is only as good as your test cases. Pay special attention to the design and testing of data migration. You need to have a disaster recovery plan in place before you start the migration process and you need to test that plan too!

Slacking on Cloud Security. Security is the shared responsibility between the customer and the cloud service provider. Having incomplete or inadequate security policies within your enterprise is the quickest recipe for failure.

Use the following checklist to ensure that there are no loopholes to exploit:

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business objectives in mind) to determine what applications to move first. Here's a quick checklist:

• Examine your current applications and estimate how much refactoring/re architecturing will be needed.

Jot down the respective costs.

• Align those with the possible ROI/benefits of migrating a certain app within the first batch. Assign priorities and plan the migration accordingly.

## Understanding Why Cloud Migration Fails



### THE DEFINITIVE GUIDE TO CLOUD MIGRATION



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### Workload centric (security and DevOps management)

- cloud security policy management
- patch management
- auditing of controls

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# How to Create a Successful Cloud Migration Strategy

As you have developed an understanding of the common challenges, it's time to move on to building the foundation of your cloud migration framework. This section provides a simple six-step approach that could be adapted to any industry.

### **Step 1: Decide What to Migrate**

This decision should be based on your reasons for cloud migrations and the possible benefits you would want to leverage. In this part, we'll help you narrow down the list of your candidates for migration. Here are the things to consider:

- Data Sensitivity/Data Warehousing **Requirements:** Does certain data need to be stored in one safe place? Are you compliant with the government regulations?
- **Compare the Cost of Ownership.** Analyze how much computing power you will need to run the application and the platform on which it is built. Data- and storage-heavy

applications may be more suitable for onsite storage. Yet, it's always worth to shop around as cloud service providers often offer more competitive prices as they are leveraging discounts from hardware vendors for bulk purchases; open source technologies and carefully optimize data provisioning.

• Current Performance. You will need to have fresh insights and visibility into your application(s) performance, along with the ability to analyze the performance after the migration to make more educated decisions. In this case, you will be able to avoid the socalled "noisy neighbor" problem – that is when one application squanders too many shared resources and impacts the performance of other applications that share the same resources.

### Step 2: Choose the Optimal Cloud Environment

The differences between public, private or hybrid cloud have been covered in the respective section of this paper. You can scroll back to page X for reference.



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### Step 3: Create the Initial Budget **Fstimates**

- To estimate accurate cloud migration costs, take the following factors into account:
- Carefully audit your current IT infrastructure costs: These typically consist of direct costs the number you are paying for on-premise hardware and software right now - plus indirect costs, which include labor costs associated with maintaining the data center, internet connectivity costs, the cost to physically maintain your IT hardware (real estate, staffing etc.) and any other additional costs that can be specifically attributed to the care after your infrastructure.
- Mind the indirect costs. Specifically, the loss of productivity of your teams and the customers when your infrastructure goes down. These may be a bit trickier to calculate, but the easiest way to do the math is:
- Review the log files to check how often your servers go down and for how long. Multiply the number by an average hourly rate.

- Next, you can estimate how much revenue is lost due to downtime per year.
- Estimate the cloud infrastructure costs. The numbers certainly won't be final but should guide you towards an approximate number. You can use the calculators provided in the previous section.
- Estimate the execution costs. In this case, you will need to estimate the following costs associated with the shift to the cloud:
- Moving all the data to the cloud. Most cloud vendors will charge a fee for transferring all the data to their system. Jot that down. Then, it's important to ensure proper data synchronization between the cloud and the legacy system. One of the common cloud migration problems is to ensure that the data stored in the data center remains up-to-date with the data in the cloud. Again, this will require time and money.
- Testing and/or re-architecting. Some apps can be sent to the cloud using the lift and shift strategy – the virtual copy-paste, requiring no further optimization. Yet, some legacy apps such as a CRM system have features that

largely depend on the on-premises servers. In this case, the application will need to be rearchitectured – add cloud-native features to optimize its performance and scale it. Certainly, this will require larger investments. If you don't have the in-house expertise for the projects, estimate the costs of outsourcing this.

Consultancy fees. First-time experiments with the cloud can be costly if conducted by non-experts. To minimize the chances of migration failure, it's always worth getting a professional assistance. A professional team could help you develop the ultimate cloud architecture, map out the cloud transition strategy and conduct the execution itself.

Calculate the post-migration costs. Obviously, those would be the monthly payments for the infrastructure itself. Plus, the indirect costs such as staff training, security, testing, administration and so on. In the long run, however, you can optimize your cloud spending.

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## How to Create a Successful Cloud Migration Strategy



### Step 4: Decide On the Cloud Adoption Pattern

The cloud transition and transformation typically follows one of the next three patterns:

### **Cloud-First Strategy**

Your enterprise is en route to complete cloud adoption. You evaluate how each application can benefit from the cloud. New projects are designed with the cloud in mind too.

Example: You have video editing software that you want to start offering as a SaaS product. Ultimately, you want to benefit both from using the public cloud and creating a private cloud out of the on-prem. infrastructure.

In this case, your next steps should be as following:

• Conduct a comprehensive product audit and evaluate which applications can be sent to the cloud and what ROI they will deliver.

 Indicate how many applications in total you would want to send to the cloud and establish the timelines for the migration.

• Choose a cloud provider (or a couple).

 Consider how the existing data centers will be used – placed on temporary maintenance or used to build a private cloud.

• Establish a cloud operating model that would outline the post-migration business process, security practices, infrastructure management and support.

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### **Targeted Approach**

Before going all-in you want to test a fraction of workloads in the cloud. The "well-suited" workloads for this include big data analytics, mobile, social and web-scale applications. Your goal is to get the initial expertise with the cloud operations.

Your next steps should be:

- Analyze the initial application needs.
- Pick the optimal cloud provider.
- Identify one or two most well-suited applications that will allow you to test the cloud environment to its fullest and deliver tangible ROI.
- Define your architecture.
- Consider implementing a multi-cloud management layer (if needed).

### **Grassroots** Approach

You want to improve the IT team productivity and start offering on-demand access to a range of cloud services. For instance, this could be

creating a cloud catalog with standardized architectures and tech stacks; delivering tools for testing/development; transitioning towards DevOps processes; supporting documentation apps such as wikis and so on.

Your further roadmap will then look the following way:

- Survey the teams to understand their needs.
- Define the initial scope of cloud services to offer.
- Specify SLAs for accessing the cloud.
- Create the content/application stacks for the new cloud.
- Build the cloud portal or connect it with an existing ITSM one.



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## How to Create a Successful Cloud Migration Strategy

### **Step 5: Choose Your Cloud Migration** Path

As the chart below illustrates, there are a couple of different approaches to migrating applications depending on their architecture and your business goals.

### Rehosting (Lift & Shift)

Lift & Shift means that you move a VM to AWS or Microsoft Azure with the same resources (Storage, Network, Database, Compute) as it currently is in the on-prem environment.

Basically, you do copy-paste with no further cloud optimization or re-architecting the product. The obvious draw – you can end up spending more on the cloud infrastructure than needed. Yet, it can save you some pretty penny on infrastructure costs in the short term and take that time to make your app cloud-friendly without hampering the traffic or data.





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### Replatforming

This type of cloud migration assumes that you will conduct certain optimizations to obtain a certain benefit, but you do not plan to change the core architecture of your product. For instance, you are migrating to a private managed cloud to take a certain load of managing databases. Or you choose to switch some expensive license software to an opensource alternative.

### Repurchasing

You merely move a certain chunk of operations to a SaaS platform. For instance, replace a legacy on-prem CRM with Salesforce. In most cases, the process is relatively self-forwards as extensive documentation is provided by the SaaS platform or the migration process is managed by the vendor.

### **Re-architecting**

When migrating you choose to tune up your product with cloud-native features. Typically, that's the go-to route for scaling an application at an affordable cost or increasing its performance. In this case, you can also add new product features that are otherwise challenging to deploy in the existing app environment.

Re-architecting is the most complicated cloud migration strategy, yet it's the one that brings in the most benefits at the same time. While Lift & Shift offers cost reductions in the short term. re-architecting allows you to entirely transform your product and make it more competitive and delightful for users.

### Step 6: Wrap It Up

Before you sign off the strategy and start the execution stage, make sure you have the following aspects covered:

 You have identified what applications to move first and indicated the respective timelines, ROI.

• You have indicated the cases when the lift and shift cloud strategy will work; and when re-architecture/re-platforming is required. Respective executors are assigned.

• You have analyzed how the migration will impact the application performance; took respective precautions and established a framework for keeping the cloud/on-prem. data synchronized.

Your initial framework for cloud migration is ready. To expand your strategy even further and develop a more hands-on understanding of cloud migration, we offer you to take a look at one cloud migration project that was executed by Infopluse team.

• Your staff knows the technology and processes. Or you have hired external expertise to execute the migration.

• You have specific plans for updating the code, testing and troubleshooting problems and measuring performance.

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In 2014, we have started partnering with a large IT service provider. During its lifetime, this company has grown through purchasing other businesses. As a result, they have ended up with a lot of legacy on-premises systems, which were not connected with one another. This issue created multiple difficulties, commanded high business running costs and slowed down further growth.

### **Business Case for Migration**

The client was already using an IBM Lotus (a bit out-of-date, yet still popular email client in Europe), as well as Exchange 2010. In 2014, they decided to switch to Exchange Online, which also pushed them to create a hybrid cloud. The client also wanted to get rid of old hardware and migrate core servers and services to Microsoft Azure, while keeping only some of the applications on-premises.

The client's business case for cloud migration was the following:

- Obtain new services and functionality offered by Exchange Online and automate manual processes with the help of those.
- Eliminate the need to maintain the out-ofdate legacy infrastructure. The costs of constant repairs outweighed the costs of cloud migration.
- Boost their brand as a leading IT solution provider, the company always follows the latest technology trends.

### Why Microsoft Exchange and Azure?

In this case, the tech stack choice was quite obvious as the company already had strong ties with Microsoft:

- They had a production agreement in place.
- 95% of the client's servers were powered by Microsoft.

In general, Microsoft offers excellent services for building a hybrid cloud. In this case, the client's cloud architecture was organized the following way:

some parts of the Exchange Hybrid and Skype Hybrid management are performed onpremises. Yet, a major part of infrastructure for the Exchange Online, Skype Online, SharePoint Online and other Microsoft services is managed by Microsoft.

Active Directory, identity management and

• The ExpressRoute technology was used to expand the on-prem. network to a virtual network (which were located at Microsoft) and served as an extension of the inner network.

Microsoft offered full support during the migration and actively consulted our team during the process.

A lot of investment was made into licenses.

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### Key Services Provided by Infopulse

Currently, we help the company with cloud migration, SAP, and CRM, and adapt their older .NET applications for further deployment to Azure. Some of the new applications we have developed for the company are now hosted on Azure as a PaaS. We also provided Internal IT Operations services for the same client in past.

The cloud migration project described in this case study consisted of the following parts:

- Office 365 Migration (SaaS project). After two years in works, it is now complete.
- **laaS migration** (in progress).
- Updating and maintaining the on-prem. network infrastructure (as a part of laaS migration project – now finished).
- Developing and deploying Azure-hosted applications (in progress).

In this section, we'll further speak about the SaaS and laaS migration services provided by our team as this case will likely speak to a lot of businesses.

Here's how it looked in its final form:

Exchange Online and Office 365 Migration (SaaS). One of the goals was to set up a federation between the local Active Directory, Azure Active Directory and Office 365 services. We have set up the hybrid Exchange infrastructure and migrated User data (almost 6,000 user accounts) from two email systems (Exchange 2010 and IBM Lotus) to Office 365. Most of the client's key services are now running in the cloud.

Server Migration (IaaS). The client originally had a lot of data centers scattered all around Europe. Some of those were in a neglected state; the rent of others was soon to expire.

To optimize the business running costs, it was decided to ditch the expiring servers in favor of the cloud. Yet, to make this technology work, we had to heavily invest in building a decent infrastructure first, ensuring a proper online connection. Only after that, we could start infrastructure migration.

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In order to perform a successful migration, we needed to prepare migration environment that included Azure Site Recovery (ASR), as well as some of the on-prem. servers to support ASR migration.

We also had to conduct an inventory of on-prem. servers. Here's how the inventory process went.

When migrating a data center you will need to "move" hundreds of servers, and a certain percentage of those will have to be turned off, as you will no longer need them. Without conducting an inventory, you will never be able to determine the "spare" servers.

Next goes the "pilot" run. We take simple, notin-use servers, test them and prepare extensive, step-by-step documentation for migration.

After the testing stage, we've made an inventory of the production servers. Specifically, we have noted what types of services and applications are currently being run on those. With this approach the inventory and prioritization happen simultaneously:

- We identify which apps are simple, which are more complex and used for key business processes.
- Based on the documentation created earlier. everything is prioritized by lots based on how critical the server is.

Initially, we installed replicas of servers in Azure, meaning that they were both present in on-prem. and in the cloud. The client could benefit from the hybrid environment as in case of the datacenter failure, all the operations kept running in Azure and vice-versa. Upon making sure that all changes in the cloud are in sync with on-prem. servers, most servers were removed from on-prem. to Azure for good.

If you want to make a step forward, you could also setup backups and Data Recovery with Azure as the technology allows this.

As a result of IaaS migration, the client closed one of the data centers with 300 servers. That's a massive cut down in business running costs.



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Since the pilot laaS migration project was successful, we are now working to migrate another data center for the same client. As of now, all the new servers will be created directly in the cloud and the number of on-prem. servers will keep shrinking.

### Key Technologies Used

For those interested in undertaking a similar cloud migration project, we are outing the key technologies in our stack:

### Server Migration (laaS):

As previously mentioned, our team has extensively used Azure Site Recovery (ASR), which enables creating copies of on-prem. servers, conduct inventory and sync all the data to the cloud. After the "copying" stage is complete, we turn off the source on-prem server, and the destination replica in Azure becomes activated.

Primary technologies used: Azure Site Recovery (ASR), Azure Site Recovery Configuration Server, Hyper-V server with ASR Provider, Recovery Services vault for Azure.

Depending on the source OS, the process of migration could require additional servers, tools, and services. E.g. in case of Windows 2003 servers, we needed to implement a multi-step conversion to ensure that the process goes smoothly:

 VMware tool was used for conversion of Windows 2003 servers to VMware virtual machines.

• A Microsoft tool MVMC was used to migrate VMware virtual machines to MS Hyper-V servers with ASR Provider.

 Only then we could migrate the Hyper-V machines to Azure.

### Office 365 migration and Hybrid Cloud Creation (SaaS):

- Microsoft Azure AD Connect and Microsoft Active Directory Federation Services.
- For data migration, we have used the following software from Dell: Dell Migration Manager for Exchange and Dell Notes Migrator for Exchange.

### The Main Challenges During the Project

The SaaS migration project took longer than initially anticipated and was close to two years. The company had over 6,000 users in legacy systems. Migrating user accounts took a lot of time and effort. We have experienced a number of conflicts in software. had to account for a lot of accompanying software and organize individual migration sessions for every user. The doable number was approximately 10 user accounts per day, so the migration process was dragging.

So if you are to migrate a large user base to a SaaS product, account for the mishaps associated with transferring tons of "personal" data.

The laaS migration project was challenging in another way - we had to make sure that the migration did not hamper the operations in any way. For instance, larger servers could not have been migrated at prime work hours as this could impact the users. Hence, we had to switch our work time.

Dealing with outdated servers was complicated as well. A lot of them were no longer supported by Microsoft or by manual migration methods. We were not able to migrate all servers: some had to be left as they are, some had to be ditched, some – recreated manually from scratch. A pleasant bonus – there were far fewer bugs.

Additionally, legacy apps can be tricky. For instance, when migrating one of the data centers, our team has discovered that in order to use a



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certain legacy app, users must have a static MAC address. Otherwise, the app will not function. Azure doesn't allow creating a service with a static MAC address at the moment. Additionally, during the migration, the IP address changes as well, which results in further issues. As a result. we had to keep this app on an on-prem. server.

### The Outcomes

While we have finalized SaaS migration, the laaS migration goes on. However, our client has already witnessed multiple benefits from the work done. Here are some of them:

 After Office 365 migration, we have consolidated all the users. Before that, around 3,000 people were using IBM Lotus for emails, whereas 3,000+ people were on Exchange 2010. Currently, everyone is integrated and has access to the same services run in the cloud. All the users are really satisfied.

- SaaS migration has resulted in a massive cut down of local email infrastructure. Ten physical servers were freed up after eliminating Exchange 2010 and 4 physical servers and 20 virtual servers were redacted after ditching IBM Lotus 8.5.
- laaS migration has significantly optimized the global resources distribution and usage. Azure enables you to track every GB of data, so you can further fine-tune the usage of resources. If at a certain point you decide to switch an expensive, yet under-used server, your data will stay safe. Microsoft allows you to keep your data safe even while not paying for the server.

The company has also eliminated hefty costs associated with maintaining and repairing out-ofdate hardware.

Also, out of 27 domains associated with this company, only three were left – another massive simplification.

- Over 9,000 Exchange Online active users.
- Over 500 active OneDrive users per day.
- Over 1,500 SharePoint Online sites, 200 active sites per day supported.



Here are some current stats for Office 365:

- Over 1,000 active Yammer users per day.
- For further details on working with the Infopulse team, please visit our <u>dedicated page</u> or contact our Head of Cloud Practice directly:

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# About Infopulse

Infopulse, part of Nordic IT group EVRY A/S, is an international vendor of services in the areas of Software R&D, Application Management, IT Operations, and Information Security to SMEs and Fortune 100 companies across the globe. The company employs over 1,700 professionals and is represented in eight countries across Europe and the Middle East. Founded in 1991, we are proud to remain among the leaders in IT services till the present day, boasting the latest technology stack and heavily investing in employee training.

Infopulse is trusted by many established brands, such as BICS, Bosch, British American Tobacco, Citrix, Credit Agricole, ING Bank, Gorenje, METRO Cash & Carry, Microsoft, Mondelez, OTP Bank, Raiffeisen Bank Aval, UkrSibbank BNP Paribas Group, VEON, Vodafone, and others.

In 2018, Infopulse was recognized among the world's best outsourcing providers in the Global Outsourcing 100<sup>®</sup> List by the IAOP<sup>®</sup>. Our team has been among the finalists of the European Software Testing Awards 2017, the DevOps

Industry Awards 2017 and the European IT & Software Excellence Awards 2017. We have also been recognized as one of the Top 25 Cyber Security Companies - 2017 by the CIO Applications Europe magazine.

For more information, please visit www.infopulse.com.