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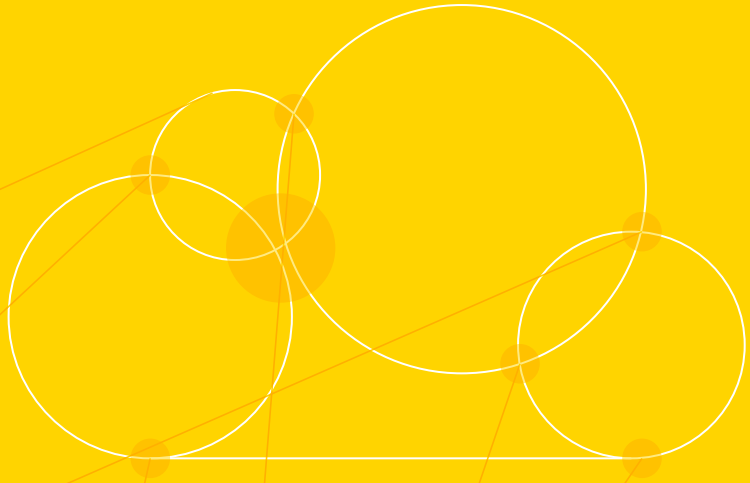

The Cloud Architect's Guide to iPaaS.

How to orchestrate integration patterns in a hybrid world.

Contents.

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Making hybrid architectures work.

Cloud computing isn't just a deployment option. It's a fundamental change in the technology strategies of enterprises around the world.

Not only has cloud computing drastically reduced the costs of enterprise technology, it is empowering IT departments to finally deliver the agility, elasticity, and innovation that the business needs.

But even though the vision for many enterprises may be an entirely cloud-first or even a cloud-only technology stack, the current reality for most is still a hybrid architecture of legacy on-premise technology and newer cloud services.

Most important, with several heterogeneous ecosystems and players in the cloud space, even a cloud-only strategy will still be a multi-platform strategy.

At the heart of every cloud strategy, there needs to be a cohesive integration strategy. One that accounts for multiple vendor ecosystems, new user roles, new technical requirements, new data types, exponential increase of data sets, and a range of new security considerations.

To that end, the success of any cloud strategy depends on two things:

First, it depends on a cloud-based integration platform designed for agility and scale that is capable of enabling different user types, managing every integration pattern, and connecting any data. But that's the easy part.

Second, it depends on a key technology strategist role. One that can plan the phased, pragmatic approach needed to bridge the gap between legacy technology and newer cloud services. This is the role of a cloud architect.

While they may hold the title of enterprise architect, just about every major enterprise has recognized the need for this role as they move from hybrid to cloud dominant architectures.

Every enterprise, large or small, old or new, needs architects who can manage the transition from a paradigm where on-premise environments were built to a paradigm where heterogeneous solutions are connected.

It's a non-trivial challenge. And it's why we've written this guide. Because orchestrating integration patterns in a hybrid environment raises a number of new questions and requires a new set of principles.

Let's dig in.

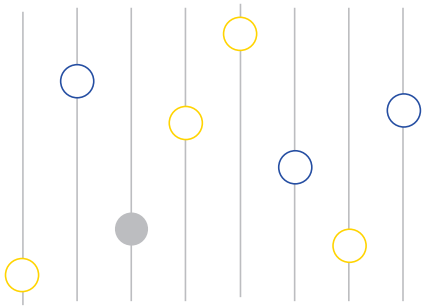
Part 1

What iPaaS is—and what it isn't.

Part 1

What iPaaS is—and what it isn't.

Today's application, data, and process integration projects need to be able to support both cloud-based applications and on-premise systems.



Additionally, these projects rely on a number of different stakeholders—IT departments, line of business (LOB) developers, application teams, and even business users (a.k.a. "citizen integrators")—to develop, execute, manage, and govern integration flows. So the cloud architect's challenge is all about finding balance.

Of course, to an architect, everything is a set of compromises. But there are two imperatives no business can afford to overlook:

- The ability to effectively integrate existing legacy systems with newer cloud services
- And the ability to deploy new data flows quickly in response to business needs.

Unfortunately, yesterday's approaches to integration (like Enterprise Application Integration and Enterprise Service Buses (ESBs)) simply aren't designed to accomplish both these imperatives.

However, cloud-ready architectures, particularly when hybrid is the norm, require interoperability with legacy tools such as ESBs to access complex applications such as on-premise ERP systems. But they also need to cater to multiple stakeholders and cloud services rapidly.

Which is why Integration Platform as a Service (iPaas) was created—to address new integration needs and reject old compromises.

"In large organizations, iPaaS characteristics fit well with CSI [cloud service integration] or MAI [mobile app integration] projects where the use of a high-end, on-premises integration platform, even if already in place, would not be easy to justify, for reasons such as time to integration, cost of entry, deployment complexity, lack of local skills, and lack of adapters for specific SaaS applications."
—Gartner[1]

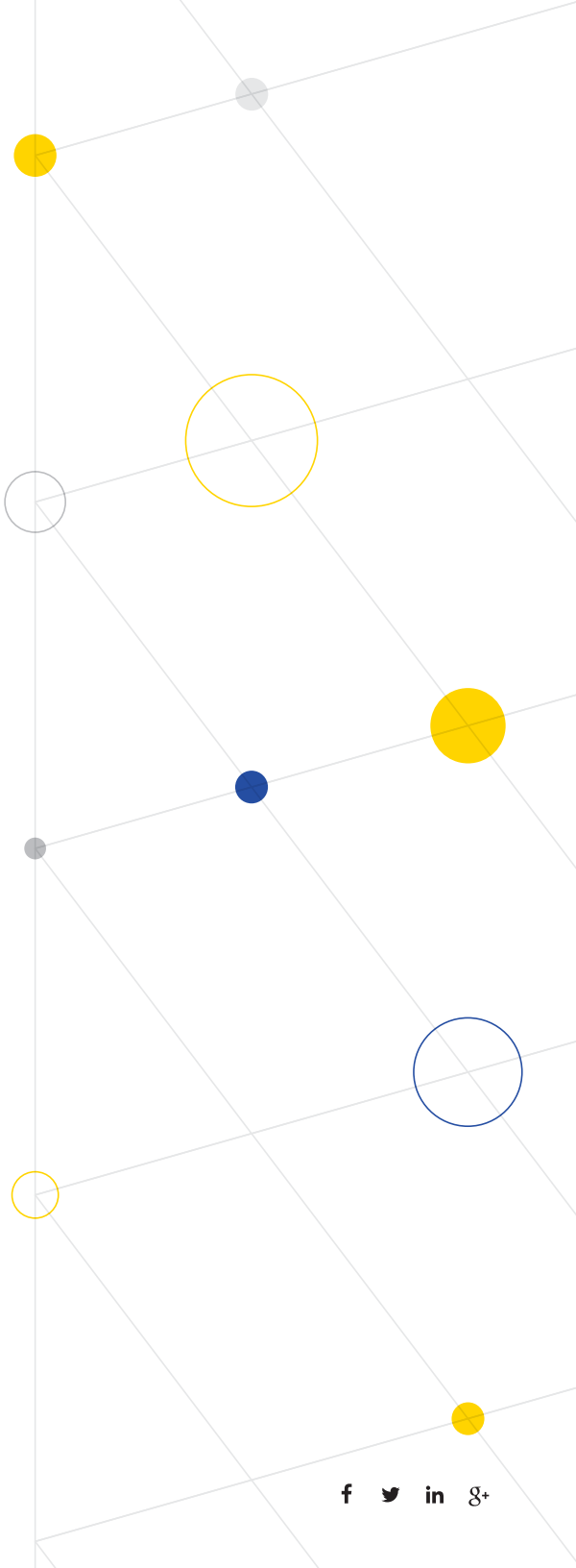
Part 1

What iPaaS is—and what it isn't.

We define iPaaS as:

- A cloud service that gives IT a single platform to manage application, data, and process integration.
- It powers development, execution, and governance of **any integration pattern** between on-premise, public cloud, and private cloud applications, databases, and other data sources.
- It delivers cloud integration services (including data integration and application integration services for batch and real-time scenarios), native connectivity, a robust API integration framework, data management services (including master data management, data quality, test data management, and data security) to manage **any data**.
- And crucially, it's built to serve the diverse needs of **any user**. It provides simple governance for IT, reusable logic for line of business developers and mobile application development teams, and ease of use for business users.

Put simply, iPaaS is a cloud-based platform that allows enterprises to rapidly execute any integration pattern, logically manage any data, and easily serve any user in need of integration.



Part 1

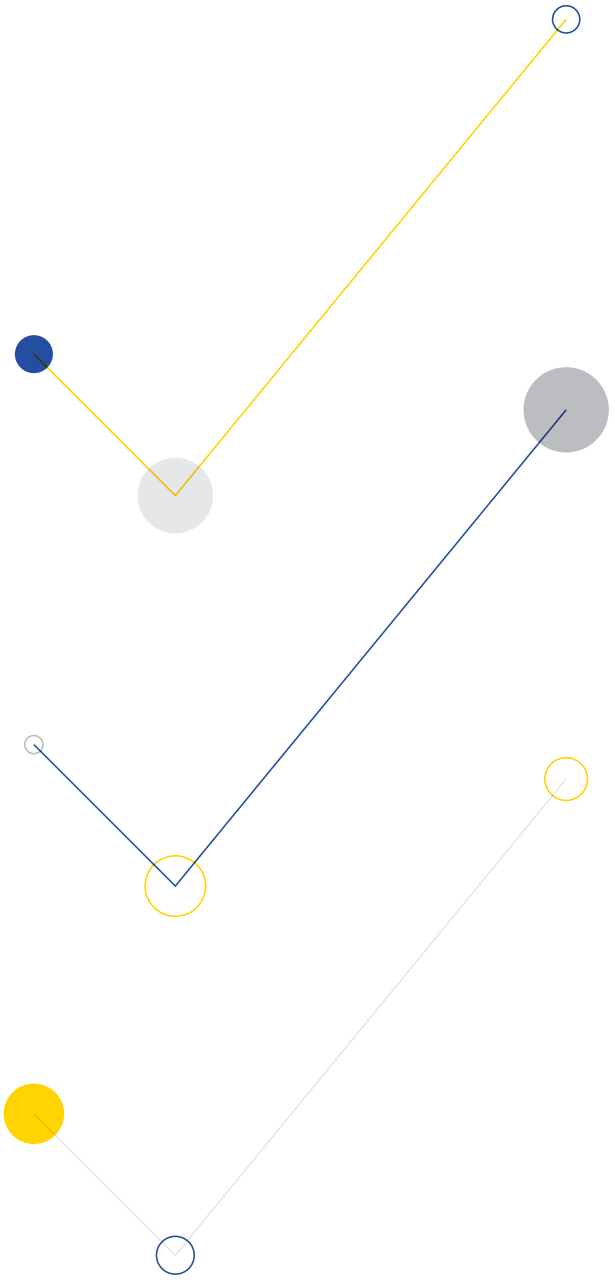
What iPaaS is—and what it isn't.

In the same way it's changed the game for countless other technologies and disciplines, cloud computing has been essential to the evolution of integration in a number of ways. (We'll skip over the more obvious cloud benefits like infinite elasticity and being able to deploy in minutes.)

First, since iPaaS is a vendor-managed or self-service solution, it's freed up IT to deliver new services without having to manage new infrastructure for a new technology environment.

Second, cloud integration services can leverage a multi-tenant repository that enables easy collaboration and sharing of metadata between IT and business users. So IT can provide centralized governance and stakeholders can use distributed best practices.

Third, most iPaaS solutions come with a growing number of pre-built connectors so that IT can easily and quickly provision connectivity to new services. Additionally, with self-service data discovery tools to determine the most appropriate schemas for entirely new patterns (like sensor logs), you can even develop your own custom connectors significantly faster.



Part 1

The importance—and limitations—of ESBs.

To be clear, an iPaaS is not an ESB. While its capabilities may overlap with some ESB features and functions, iPaaS is designed specifically for hybrid environments with agile, highly targeted, simple consumption and ubiquitous access (via APIs) patterns.

ESBs, on the other hand, were designed to manage access to legacy on-premise systems such as ERP systems via a loosely coupled service-oriented interface. While this was good in theory, the inflexibility of underlying technologies makes it expensive, unwieldy, and hard to evolve in practice.

When used as a means for simple message brokering and decoupling of systems, ESBs can continue to play an important role for complex legacy on-premise systems.

But in the context of hybrid architectures, the rationalization of ESB tools with an iPaaS-based approach is crucial because ESBs have some fundamental limitations:

They lose metadata at end-points: ESBs don't intersect the metadata event points or have an object-level understanding of the systems they connect to. That means they can't prioritize and differentiate the way they deal with data when they integrate it. So they force you to deploy custom code to cater to different business requirements.

They lack built-in data management: An enterprise architecture is incomplete without both an ESB and an enterprise data management tool. So you can't hinge your hybrid integration strategy on an ESB without accounting for the data quality, master data management, and security needed for data.

They aren't workflow-oriented: Users and lines of business are taking on more responsibility for their applications and data. So the workflow and user experience you deliver becomes as important as the data and applications being used. While an ESB helps IT, the business will not be able to use it to manage their own integration flows, thereby limiting your strategy.

They force you to write a lot of custom code: When it comes to things like creating composite messages, Quality-of-Service (QoS) provisioning, two-phase commits, and guaranteed message delivery, ESBs require a lot of custom code. This slows developers down and increases the length of integration projects—both of which hurt the business.

To sum up: it makes sense to use an ESB to access the legacy endpoints they're already wired for, if your functional requirements are met. But as your architecture becomes more cloud and hybrid-centric, it makes a lot more sense to start using an iPaaS as your integration backbone.

Part 2

Common enterprise use cases for iPaaS.

Part 2

Common enterprise use cases for iPaaS.

As with most cloud services, you don't need to be in IT to use iPaaS. With today's tech-savvy employees, everyone from business users (a.k.a. "citizen integrators") to application developers can use an iPaaS solution to solve tactical integration needs quickly.

But for the purposes of this guide we're going to be focusing on four strategic, enterprise-wide use cases that really show the power of a hybrid integration platform powered by an iPaaS:

1. 'Lift and Shift' initiatives and data migrations
2. Hybrid data warehousing
3. Hybrid app integration
4. Mobile app interaction

1. 'Lift and Shift' initiatives and data migrations

When it's just too expensive to maintain the physical infrastructure of legacy in-house applications and their associated data workloads, you may choose to 'lift and shift' them over to cheaper cloud environments without any re-design. That way, you can either re-design them once they're in the cloud, or phase them out more efficiently.

Either way, moving an entire application or even some of your data to the cloud is often essential to finding a balanced way to reduce costs and maintain business continuity.

But application migration can be incredibly risky. According to Gartner: "Through 2019, more than 50 percent of data migration projects will exceed budget and/or result in some form of business disruption to flawed execution."[2]

So the key to mitigating the risks of moving some or all of an application's workload to a cloud-based infrastructure lies in leveraging an iPaaS' pre-built connectivity to existing applications and other data sources. Because it means you can more easily leverage best practices for integration workflows, mappings, and data transformations.

The reality of 'lift and shift' initiatives is that data and apps will be spread across on-premise and cloud. So you need a hybrid integration platform to connect the data and apps together in a secure way across firewall boundaries.

Not only does this prevent the loss of any crucial information or compromises to security, it actually increases developer productivity by making logic and code reusable.

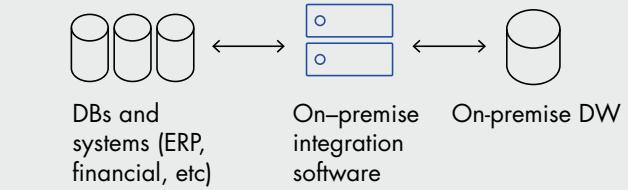
In fact, these benefits are actually amplified when you 'lift and shift' the integration layer itself because it reduces the costs of managing, monitoring, and upgrading the on-premise infrastructure.

Part 2

Common enterprise use cases for iPaaS.

1. 'Lift and Shift' initiatives and data migrations

Before



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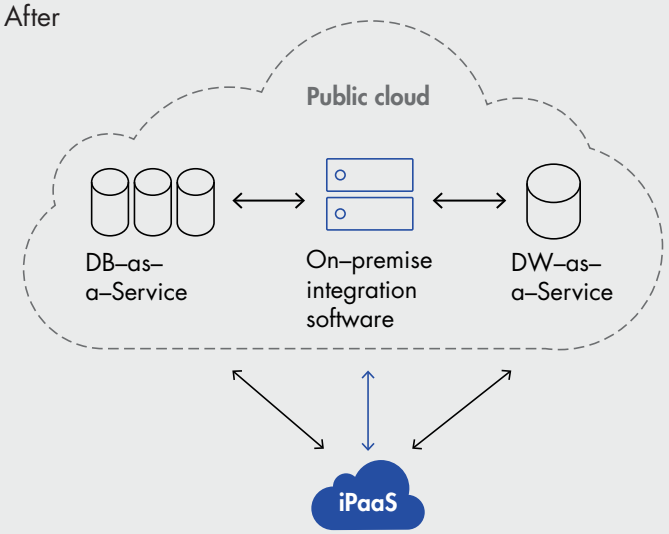


iPaaS capabilities:
Cloud data integration and application integration, process integration and API integration, data management services such as cloud MDM, cloud DQ, test data management, and data security.

Part 2

Common enterprise use cases for iPaaS.

2. Hybrid data warehousing

More and more, companies are looking to extend their data warehousing capabilities with the cloud.

In some cases, this may mean using something like Hadoop to store large amounts of unstructured data for pre-processing. And in others it might mean using something like Amazon Redshift or Azure SQL Data Warehouse for warehousing at scale.

But as easy as it is to spin up a new cloud data warehousing node, you still have to be able to populate it with data from your on-premise data stores. And you still need to be able to combine the data originating from on-premise systems with the data originating from cloud-based services and systems.

Here, a hybrid integration platform like iPaaS is key for a few reasons:

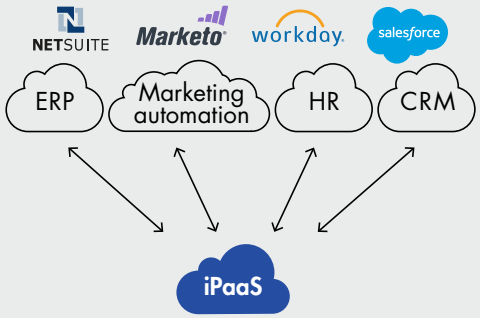
1. It delivers connectivity to cloud data warehouses (like Amazon Redshift) via a scalable interface that can handle large volume loads.
2. It gives you the ability to implement standard data warehouse integration patterns like "slowly changing dimension patterns".
3. It gives you the ability to push down processing to where the data is, thereby delivering optimal performance and reducing the network bottleneck.
4. It allows you to reuse logic from on-premise data warehouse implementations, including integration workflows, mappings, filters, and transformations.

Part 2

Common enterprise use cases for iPaaS.

2. Hybrid data warehousing

Before



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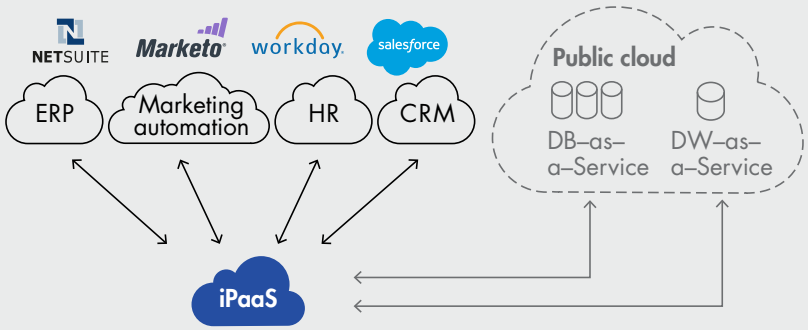

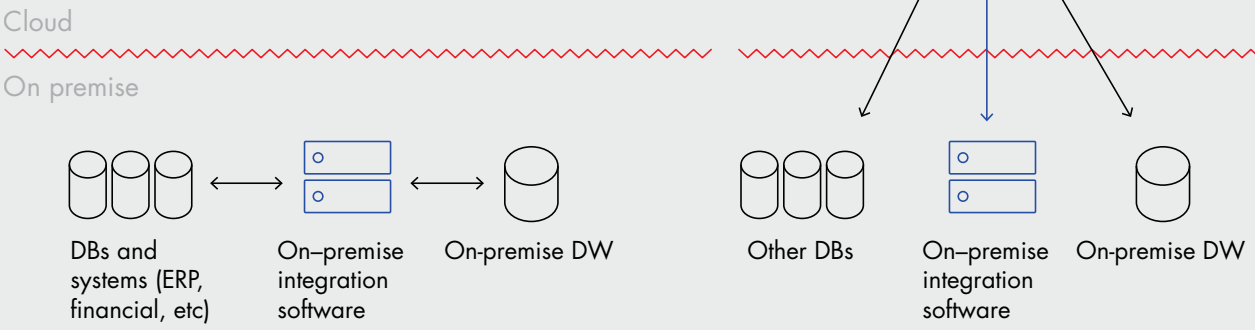

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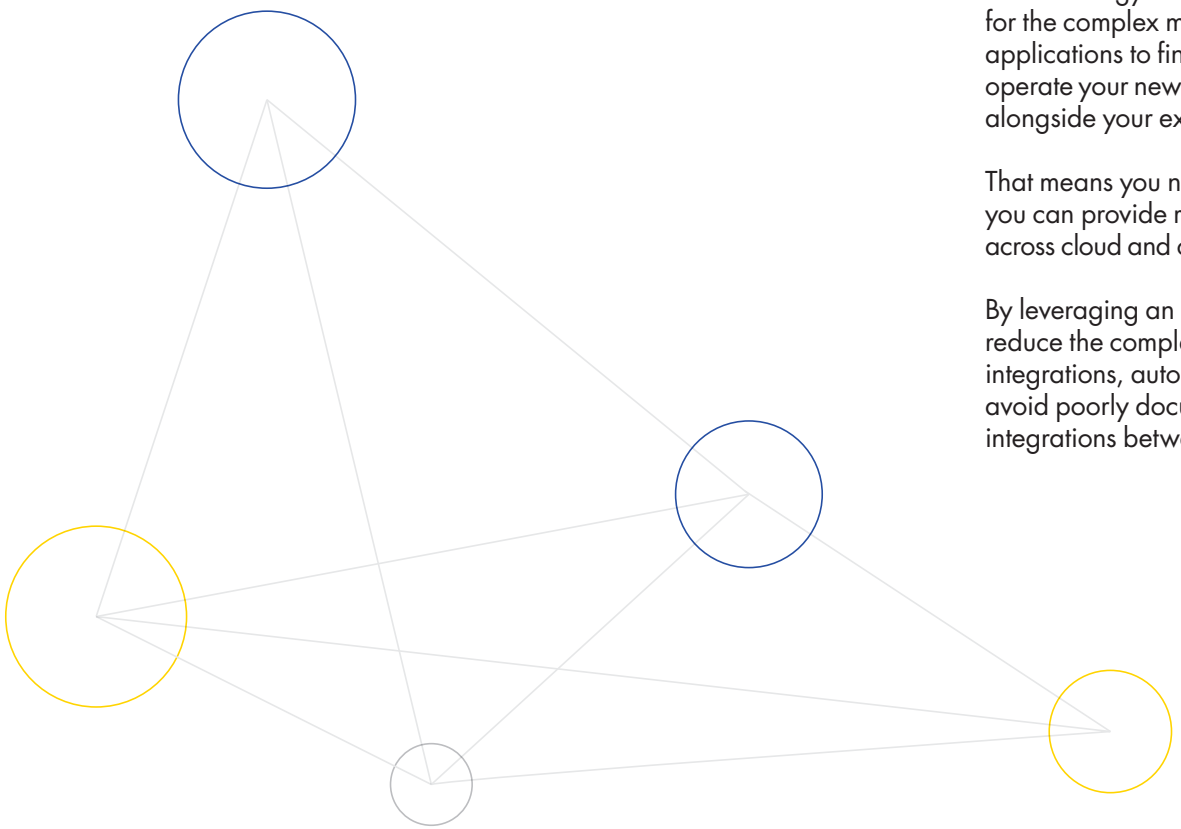


3. Hybrid app integration

Applications are at the heart of any cloud strategy. So rather than wait for the complex migrations of on-premise applications to finish, it makes sense to operate your new systems of engagement alongside your existing systems.

That means you need to make sure you can provide real-time connectivity across cloud and on-premise applications.

By leveraging an iPaaS, you can reduce the complexity of point-to-point integrations, automate connectivity, and avoid poorly documented, hand-coded integrations between end-points.

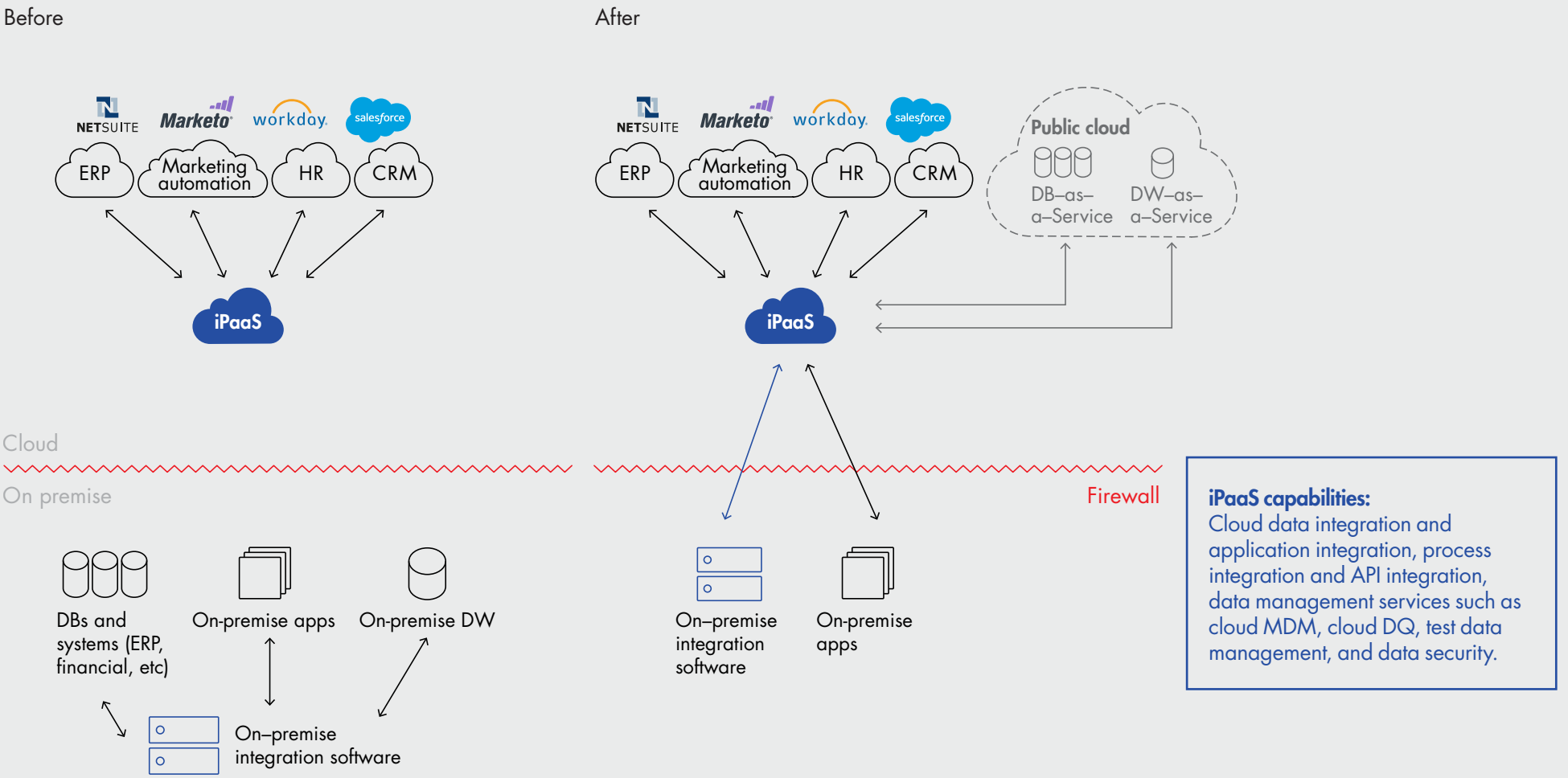
Spaghetti code and a lack of rationalization within the firewall is a challenge. But spread across multiple cloud vendors and on-premise environments these issues become business liabilities.

A single cloud integration platform provides the governance and centralization of best practices that you need, while still ensuring business users have access to the data and connectivity they need.

Part 2

Common enterprise use cases for iPaaS.

3. Hybrid app integration



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Part 2

Common enterprise use cases for iPaaS.

4. Mobile app interaction

Businesses (and business units) are under a lot of pressure to take advantage of mobile. This might entail creating a customer-facing application that makes it easier to interact with your products and services. Or it might entail creating an operational application to connect internal processes. Or it might entail both.

Whatever the mandate, successful mobile applications will rely on your ability to eventually extend your cloud platforms and provision master data in near-real time. That means being able to expose the right APIs to mobile applications created by several departments.

With a robust API framework as well as a repository of reusable transformations, connectors, and adapters, iPaaS gives you the ability to provision connectivity efficiently and repeatedly.

The ecosystems shaping the cloud

Even with the massive rise in cloud computing across every industry, there are a few dominant cloud infrastructure vendors that are shaping the way enterprises leverage the cloud. And the lines between PaaS (Platform as a Service) and IaaS (Infrastructure as a Service) offerings are starting to blur.

A smart integration strategy is essential if you want to ensure you can use your data across these platforms and vendor ecosystems:

Amazon Web Services (AWS)
Storage: S3
Data Warehousing: Amazon Redshift
Big Data Analytics: EMR

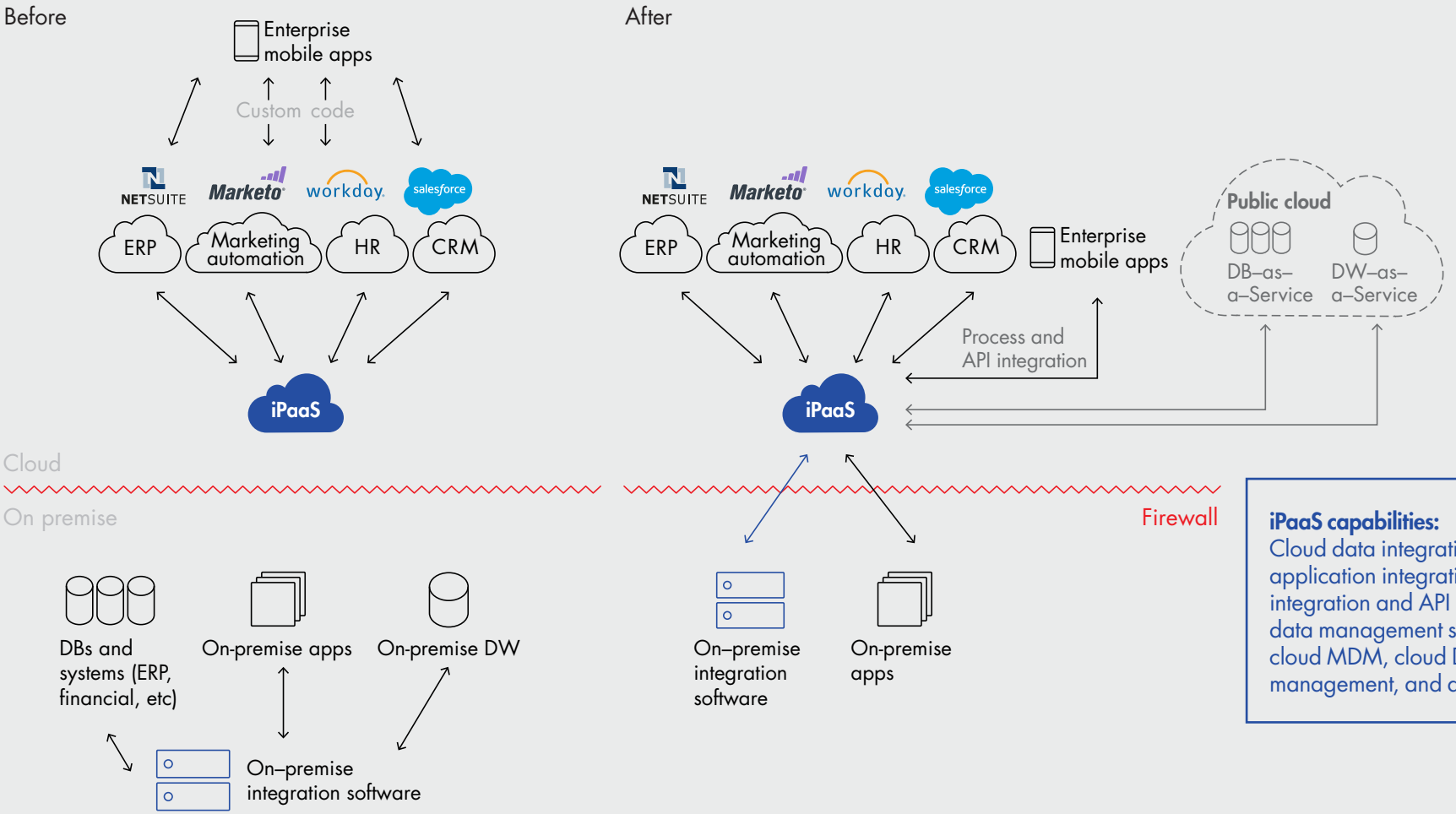
Microsoft Azure
Storage: Azure Blobs
Data Warehousing: Azure SQL Data Warehouse
Big Data Analytics: Azure HDInsight

Similarly, other key cloud infrastructure players include Google Cloud Platform and Salesforce App Cloud.

Part 2

Common enterprise use cases for iPaaS.

4. Mobile app interaction



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Part 3

The nine laws of hybrid integration.

Part 3

The nine laws of hybrid integration.

Integration used to be run by a small group of experts in IT. But the proliferation of cloud solutions, the aggressive adoption of those solutions by lines of business, and the emergence of agile approaches to integration has changed everything.

The challenge for cloud architects is twofold. First, it's about managing the immense complexity of heterogeneous integration needs across multiple on-premise and cloud environments. And second, it's about doing so while still reducing the amount of time it takes to integrate.

These are new challenges. And they call for a new set of laws to guide your integration strategy.

1 Versatility is key

A defining characteristic of the cloud's impact is the rapid proliferation of technologies from new vendors. The good news is that the business has easier access to more services and capabilities. But integrating these solutions in an efficient, timely, and secure way is crucial.

Your iPaaS needs to maximize your ability to execute, provision, and manage integration patterns across the cloud, on-premise environments, B2B gateways, and mobile applications.

For the most common integration patterns (like Salesforce to SAP), it helps to leverage pre-built connectors. But when it comes to newer patterns (e.g. sensor logs), you also need to be able to use self-learning data discovery tools to profile new data, parse new file formats, and quickly determine appropriate schema.

Part 3

The nine laws of hybrid integration.

2 Optimize for openness

Your integration strategy needs to be able to conform to your cloud strategy. So your iPaaS should give you the ability to execute any integration pattern, manage any data, and serve any user. Anything less and your integration strategy will only add to your fragmentation problem.

The good news is that being a cloud service itself, iPaaS will evolve and develop, releasing new versions and capabilities over time. But it's essential to ensure that it gives you the neutrality you need to work with multiple cloud platforms and any existing on-premise environments. Given the pace of innovation, it's important that your iPaaS is designed for change and can easily incorporate the latest capabilities in fast moving areas such as big data, SaaS, mobile, and the Internet of Things.

To make the most of your evolving hybrid environment, you'll need to be able to tap into the unique capabilities of different ecosystems like AWS, Microsoft Azure, and Salesforce, just to name a few.

Part 3

The nine laws of hybrid integration.

3 Metadata matters

The difference between a 'dumb pipe' and a 'smart pipe' is its ability to give you insight into and centralized control over the data and applications being integrated. So your iPaaS needs to give you an object-level understanding of the systems it's connected to.

That way, you can ensure it uses what it knows about objects, hierarchies within objects, and the way objects relate to each other to prioritize and differentiate the way data is managed.

More important, a global repository of metadata gives you the ability to reuse connectors, transformations, and business logic across your environment. This is big for two key reasons.

- It increases developer productivity and reduces the amount of time it takes to provision connectivity, thereby lowering the cost of switching between different platforms.
- It increases your visibility into how different patterns are executed and different data sources are managed, making it significantly easier to govern and maintain best practice.

4 Let data gravity guide your architecture

The more lines of business adopt new cloud solutions, the more enterprises are going to find their data living outside the firewall. So as far as your enterprise architecture is concerned, you're going to need to ensure you have the tools to both streamline and secure access to all that data.

On the other hand, even the most ambitious switch to a cloud-only or cloud-first architecture won't happen overnight.

So you also need to ensure the data stored in on-premise environments like legacy ERPs—systems that are too big to migrate and too important to phase out—is equally secure and ready-for-use.

The point: your integration strategy needs to be able to straddle both realities. And you'll need to be able to manage both batch data integration patterns and varying degrees of real-time integration patterns in an optimal way without compromising on performance and scalability requirements.

Part 3

The nine laws of hybrid integration.

5 Data management and analytics can't be an afterthought

Data is no longer just a by-product of a technology strategy. Increasingly, data defines the strategy. Lines of business need data to do their jobs more effectively and analytics has changed the competitive landscape for just about every industry.[3]

So as enterprises move to the cloud, there's an important opportunity to improve the way data is managed and prevent the mistakes of the past.

As part of your integration strategy then, it's essential that you lay the foundations for effective, automated, and repeatable capabilities like data quality, master data management, test data management, and data security.

You should aim to ensure:

- Business users have access to and confidence in the data populating their new applications
- IT stakeholders have an efficient and reliable way to govern and manage data without holding the business up
- Analysts can easily use any data for insights—when they need it.

6 Centralize governance

As lines of business aggressively adopt new applications and data sources, your technology landscape will continue to fragment. But while a fragmented landscape is harder to govern and manage in the short term, a new integration strategy is an opportunity to fix old issues.

For IT to be able to govern effectively and efficiently, you need to ensure they can create rules once and then propagate those standards across the enterprise.

That is, IT needs to be able to establish best practices efficiently and line of business users need to be able to use them without slowing their own processes and projects down.

To that end, an iPaaS is an essential tool to centrally govern and distribute standards across both on-premise environments and multiple cloud platforms.

Part 3

The nine laws of hybrid integration.

7 Distributed self-service

Line of business users are increasingly looking for self-service integration tools that leverage an easy-to-use guided user experience (e.g. wizards) so they can quickly define and execute many types of integration scenarios themselves.

From an architect's perspective, that's great because it creates a more manageable division of labor. From the lines of business' perspective, it's great because it ensures users can integrate new apps and other data sources when they need to for their day-to-day tasks.

And from IT's point of view, this should be great because it means they can provision best practices and security without getting in the business' way. But all of this rests on the assumption that line of business users, IT, and the cloud architect share a unified approach to data sources, data workflows, and integration.

One that, if you'll pardon the irony, is integrated itself. That means using a common toolset that gives IT visibility and the line of business control, while providing agility for the entire organization.

8 Orchestrate human processes

Another fundamental requirement for a common strategy that benefits IT and the business in equal parts is user experience. Business users need to have tools that make data preparation as easy to use as Excel. And they need to be able to use workflows to get things done.

As Gartner finds, "By 2017, in large organizations at least 65 percent of new integration flows will be developed outside the control of IT departments." And that, "By 2018, in most organizations at least 50 percent of new integration flows will be implemented by citizen integrators."[4]

So it's as simple as this: without great user experience, the self-service dream falls flat. If the technology you make available to your business users isn't intuitively easy-to-use, your integration strategy will fail.

For instance, if you have people working in call centers (where there's a high rate of turnover), it's important that you give users a workflow- or business process-oriented tool so they know which steps to follow.

Moreover, your iPaaS needs to streamline the service orchestration and process integration needed to ensure these workflows extend beyond the boundaries of individual departments and organizations.

Part 3

The nine laws of hybrid integration.

9 Security needs to be baked in

Fortunately, there's a lot less paranoia about hosting data in a public cloud. But there are still some non-trivial security challenges that come with hybrid, multi-platform environments.

For one thing, ensuring the same security policies are followed across platforms and environments without a common integration platform is inefficient at best and ineffective at worst.

But the other big challenge is to do with the democratization of access to data and applications. It doesn't matter how impenetrable AWS' security is, if your Hadoop instance is a free-for-all and full of sensitive data, you're in trouble.

When it comes to data and application security, you really need to ensure your iPaaS is ready for four dimensions of security:

- **Data masking:** To ensure only the right people have access to the data and your cloud platforms can dynamically hide or reveal sensitive data.
- **Application security:** To ensure the security policies set up within the applications you're integrating are applicable across the environment.
- **Encryption:** To ensure you can protect data where it lives and integrate with new tools like Kerberos and Sentry.
- **Profiling:** So you have a 360 degree view of sensitive data as it moves—as well as automated documentation of data lineage to maintain auditability.

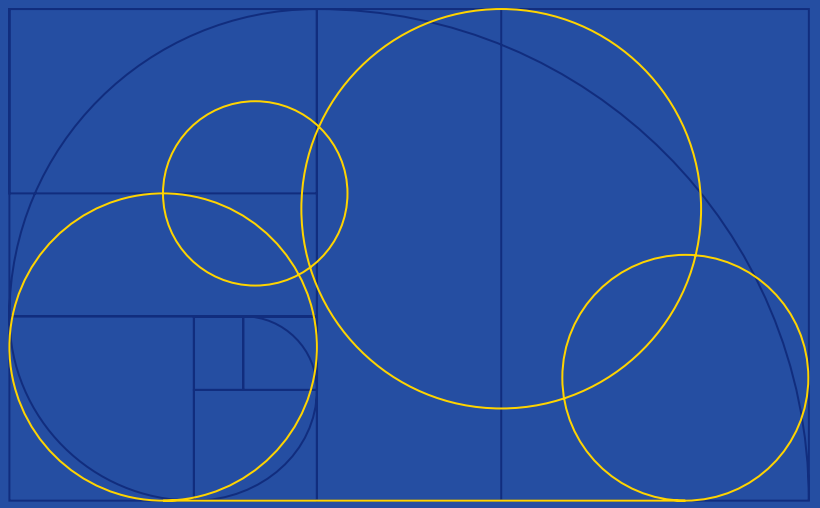
Additionally, the notion of openness plays a role in security too. Because as data, application, and network security evolves, you need to be able to account for newer capabilities such as security for data in motion.

Conclusion

The integration imperative.

The integration imperative.

At this point there are no two ways about it: the cloud represents a strategic leap forward for companies. But no modernization initiative can afford to ignore the integration and data management in a hybrid environment.



And without an integration strategy to straddle the complexity of on-premise environments and multiple cloud ecosystems, making that strategic leap forward isn't going to be easy.

The good news is that the emergence of iPaaS has meant enterprises have exactly the technology they need to bind their integration strategy together. And with the continued development and education of the cloud architect, they have exactly the role they need to implement such a complex strategy.

As we said at the beginning, to an architect everything is a set of compromises. We hope the principles we've outlined in this guide help you make more informed decisions about what your iPaaS should and shouldn't be allowed to compromise on in the context of your integration strategy.

While the last few years of enterprise IT have been characterized by feverish technology adoption and experimentation, it's clear the next few years will hinge on a new imperative: to integrate, consolidate, and organize.

Learn more.

Sign up for a free session with our Virtual Architect to get all the help you need to go live with your cloud projects. We'll cover a range of the most popular cloud projects in our scheduled sessions—from working with connectors to designing a real-time application integration workflow.

Register now.

Sources.

1. Gartner Magic Quadrant for Enterprise Integration Platform as a Service.

2. Gartner, "Best Practices Mitigate Data Migration Risks and Challenges," Ted Friedman. 9 December 2014.

3. Forbes, "84% of enterprises see big data analytics changing their industries' competitive landscapes in the next year." October 2014

4. Gartner, "CIO Call to Action: Shake Up Your Integration Strategy to Enable Digital Transformation." Massimo Pezzini, Benoit J. Lheureux, Keith Guttridge. 26 November 2015.