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Red Hat

BUILDING THE ROAD TO A HYBRID CLOUD FUTURE

Finextra

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01
FOREWORD

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Director, Head of Global Financial Services Strategy, Red Hat

It is safe to say that the financial services industry is fully vested in the cloud. While a significant number of institutions were already well established in both private and public clouds, the past two years have broken down any holdouts. As customer demand for digital services increases, so does the need to provide a stable and secure infrastructure. To put it simply: The question is no longer if and when you should move to the cloud but how and where.

Like in nature, the cloud migration pattern of banks and other financial institutions is never a straight line. As we see from the interviews in this paper, different business units have different needs and, in fact, different definitions for hybrid cloud.

At Red Hat, we have seen that many institutions have become multi-cloud by default, not by design. Still getting the benefits of agility and speed-to-market, but lacking hybrid cloud benefits of interoperability and elasticity, not to mention the portability and interoperability of an open hybrid cloud.

Cloud strategy, like all strategies, needs to evolve. When institutions moved only a small percentage of non-critical applications to the cloud, they could look at a single cloud provider. As more and more applications and interdependencies are created, it is vital to plan for how your infrastructure supports and leverages these multiple operating environments.

The open hybrid cloud model provides the most flexibility for how you build and deploy and operate your applications. Institutions will balance between applications deployed on their private cloud vs. those developed and deployed on public clouds. The open hybrid cloud allows financial institutions to adjust benefits and risks. Similar to the original value proposition of the public cloud - to burst when needed, the open hybrid cloud model will enable you to adjust where applications are deployed. Building applications once, and deploying anywhere-and then moving,-to enable risk-avoidance exit plans.

As you read this paper, we hope you see how “building the road” is just as important as the destination. The cloud enables institutions to innovate and provide new services delivering immense value to their customers, but the road has many options and turns available. The open hybrid cloud offers the flexibility to build for the present and the future.

02 INTRODUCTION

A recent survey conducted by Finextra and Red Hat showed that 82% of the financial services respondents say they are embracing and implementing hybrid cloud infrastructure company-wide.

Many are now deploying open source technologies to support and enhance the inherent capabilities of a hybrid cloud infrastructure, which include agility, resilience, portability, automation, speed to market and continual testing and iterative improvements at speed in isolated, protected environments. The open hybrid cloud adds interoperability to this, and is a factor cited by leading practitioners as increasing their ability to attract developer talent.

These attributes, however, will mean very different things to different business stakeholders and will therefore be prioritised in differing orders by different business lines. Speed of development and speed-to-market will likely be of greatest importance to digital programme strategists and developers, whereas portability will be more important to someone leading system recoveries or performance outages, where operational resilience is key.

Where these priorities conflict – or complement – each other needs to be identified and communicated to the board, for a cohesive, top-down strategy to be fulfilled with a consistent approach. There will be different challenges in executing that strategy across different parts of the business - there could be gaps in knowledge, understanding or expertise, hence where these challenges lie and for whom becomes a compelling question to answer.

"At times we are asked the question, 'Should we open source what we have built and make it available to the community?' We have to talk about this, it is very culturally driven; we have an engineering culture that swears by the use of open source technology. So far, it has not conflicted with any of our conversations with enterprise banks."

JAN VAN VONNO, RESEARCH DIRECTOR, TINK

Overcoming different hurdles and identifying the different benefits is a key part of a strategy to fully realise the potential of cloud architectures. And all strategies need to take a long-term view – the migration from on-premise systems in bank-owned data centres to a cloud service provider and on through hybrid cloud environments is a dynamic culture shift rather than a quick decision to migrate a few workloads and reap the benefits. Financial organisations need to know and understand the value of what hybrid cloud can deliver to what part of their business and overall operations, and they need to identify the different gaps and challenges in order to achieve the required outcomes. It is no small journey or undertaking, but the benefits can be universally acknowledged as a clear incentive.

This research paper from Finextra, in association with Red Hat, is based on several interviews with senior leaders from diverse areas of the banking business to explore and understand some of the key questions around hybrid cloud.

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>
> TOM HARRIS, CHIEF TECHNOLOGY OFFICER, CLEARBANK

03 DISPELLING THE CLOUDS

Financial Institutions took some time to fully embrace cloud computing, in the general use of the phrase, but over the past few years have been enthusiastically embracing the architecture as they undergo significant digital transformation.

Today, the largest FIs have moved from a position that only internally developed cloud architectures running in their own data centres could address the complexities of their needs to a widespread adoption of hybrid clouds operated by large scale suppliers.

Hybrid cloud, coupled with open source technologies where applicable, offer significant benefits across many business functions:, these include agility, resilience, portability, automation, speed to market and continual testing and iterative improvements at speed in isolated, protected environments.

Before delving into how these benefits are perceived by different stakeholders across financial institutions, it is worth pointing out that there remains a great deal of confusion across the industry as to what hybrid cloud means. “If I look at my colleagues in other parts of the bank who are engaged in ‘hybrid cloud’ developments, I find that either they or I are wrong about what the term means, and if that means one of us is going down the wrong path and won’t fully realise the objectives of the project,” says one chief architect at a large international bank.

“It does seem to mean a lot of different things for lots of people. It’s a bit of an ambiguous term,” says Tom Harris, chief technology officer at Clearbank. “People say, ‘we’ve got computing in our own cloud’ but I often think they’re still talking largely about their own virtual machines, with maybe some connectivity to the real world in the cloud. And maybe their little R&D FinTech arm is really in the cloud, but fundamentally, the likes of Azure, AWS and Google just take it to a whole other level in terms of the time it takes to create infrastructure.”

David Terrar, research director, digital and strategic advisor at Bloor Research and chair of the Cloud Industry Forum, agrees that there is ambiguity: "To explain what we really mean by hybrid, let's first get a few things straight. Cloud is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources, by which we mean networks, servers, storage, applications and the services that support them," he says.

The current position is that most organisations operate multiple different cloud applications: "That includes cloud native applications they've developed themselves, SaaS applications they've acquired that run on their own public cloud, and those cloud native applications could be running on public cloud services like those from Amazon, Microsoft, Google or others, but they could also run on private clouds that might be in their own data centre or a service providers data centre," says Terrar. "That's really what we'd describe as a multi-cloud environment."

A hybrid cloud implementation is "a mixture of public and private infrastructure supporting one or more applications, says Terrar. "For example, an app might run on-premise in [a bank's] own data centre, or as a private service from a particular provider, but with the ability to burst out to the public cloud to support a big increase in workload, or to run analytics, or to support some other specific business outcome that needs an elastic compute, on demand, or pay as you go capability to work cost effectively." A similar use of secondary cloud would be for disaster recovery purposes.

The open hybrid cloud model adds further flexibility to these capabilities, an important one of which is the ability to build and applications with a variety of different development tools and deploying the applications on the best possible cloud – and the ability to move if it is no longer the best option.

> **"Originally, organisations and financial services firms were moving to the cloud to achieve cost reduction objectives such as the move from Capex to Opex. This has changed now that firms recognise that the cost benefits don't add up as well as some of the other benefits of scalability, flexibility, innovation, and firms being more attractive to developers if they're working on the public cloud."**
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> COMPLIANCE AND OPERATIONAL RISK EXECUTIVE AT A LARGE LONDON-BASED BANKING GROUP

04 BENEFITS

From a banking perspective, particularly for those with legacy systems, the attractions of a hybrid cloud environment are more practical than theoretical. “Hybrid is where a company has compute storage and networking across both the public cloud and on-premise technology,” says a compliance and operational risk executive at a large London-based banking group. “Most organisations on the planet are currently moving compute storage and networking to the cloud if it’s not already there.”

That wasn’t the case as recently as five years ago: larger banks – particularly international transaction and security processing firms – would point out that they had adopted ‘cloud architectures’ in their private data centres but would not consider the use of public cloud environments. Regulatory and security issues were often the standard justification, so it is telling that a compliance executive goes on to say that hybrid environments have become the norm in financial services because of how the business case stacks up.

“Originally organisations and financial services firms were moving to the cloud to achieve cost reduction objectives such as the move from Capex to Opex. This has changed now that firms recognise that the cost benefits don’t add up as well as some of the other benefits of scalability, flexibility, innovation and firms being more attractive to developers if they’re working on the public cloud,” the risk executive reveals.

This more nuanced understanding of the cost/benefit issues is echoed by the chief architect: “Cost-saving is still the most widely used justification in budget meetings but there is, increasingly, an understanding that it is not as simple as just moving from fixed- to variable-cost or OpEx versus CapEx,” he says. “Portability leads to reduced costs, particularly in the kind of project where you are developing a service in one geography with the intention of rolling it out in another, which is something we do constantly.”

Wouter Meijs, global head of cloud at ING, says it is important to distinguish between private and public cloud when considering the cost factor. “For private clouds, it’s clear that there’s massive cost savings, because we automate the hell out of everything. Which means that engineers can simply do so much more with their time, and actually focus on building products for our customers rather than setting up infrastructure,” he says. “On the public cloud, it is all about functionality. It is not a cost saving programme: we really do this for the feature richness of the public cloud, to make sure that our developers get the best experience.”

Meijs sees three main use cases that make up a hybrid cloud environment, and says the bank intends to push as much as it can into the cloud , both public and private. “In a nutshell, our strategy is to run everything that is cloud-native in the public cloud – though cloud-native is an ill-defined term. For us it means those services that are made for the public cloud but aren’t available on a private cloud,” he says. “It means we can use the elasticity that is available in the public cloud, which is expensive in the private cloud. Then there are things that we can’t run in the public cloud and there we go for private cloud – primarily the 24/7/365 type of applications that have very little elasticity, which makes it just very, very expensive to run them on public cloud. There are others that we can offer out of the box on our private cloud but can’t use in the public cloud: there is no Tibco as a Service in the public cloud – why would there be? – so we have to use our private cloud. The third area is applications that require specific forms of disk replication that the public cloud doesn’t offer.”

Reuben Athaide, head of cyber security advisory and DevSecOps (and former head of business cloud enablement) at Standard Chartered Bank, “Moving to cloud, be it multi-cloud or hybrid, enables businesses to be agile, scale, achieve a higher velocity and ultimately get products to customers a lot quicker. Cloud also boosts productivity as well as being on the cloud may also attract top tech talent. Cloud compute can be delivered in several forms. Developing with it via Platform as a Service (PaaS) and/or subscribing to it through Software as a Service (SaaS) shifts the heavy lifting to the service provider so – for commoditised services – cloud consumed as PaaS and/or SaaS – it will indeed enable a business to be agile, nimble, and responsive to customer needs.”

Like ING's Meijs, Athaide says it is important to consider what should be moved to the cloud , and advocates looking at optimising workloads across systems. "In a large, regulated enterprise, there is a lot involved in onboarding a new cloud service provider as well as learning the new platform," he says. "Hence, I would recommend optimising usage – not all workloads are created equally. Perhaps some workloads or tech stacks are better suited to a particular platform, or usage can also be segregated by portfolio, which is a better approach to leveraging multi cloud as opposed to trying to run workloads in parallel across multiple cloud service providers."

While hybrid cloud does provide flexibility, Athaide says the flip side is that it introduces several new challenges, among which he includes having to manage more than one Cloud Service Provider (CSP), which may be a bigger challenge for a small to mid-size organisation. "It is also very difficult to acquire and retain talent, [and] with multi-cloud that challenge is expanded," he says. Other new challenges he cites include the cost optimisation of workloads across CSPs and moving data.

Jan van Vonno, research director at open banking platform provider Tink, which supplies systems to many large financial institutions, says that hybrid cloud is essential for all of those reasons. "Working with a lot of the Tier 1 banks across Europe – we work with one or more Tier 1 banks in every single Western European country – we need to be flexible in how we deliver our services. Certain clients demand a certain hyperscaler or require the code to be deployed on-prem, [so] we need to have teams and the capability of managing that in a flexible way. That does mean that at times, our customers will be running a certain version of one of our applications in their private cloud or on prem environments, while we are upgrading that version in our public cloud environment, and every now and then you'll need to push and reconcile the code. And, obviously, that will come with the necessary support and change management."

While cost-saving was once seen as a significant reason to move to the cloud, security, data privacy and regulatory issues were the major objections put up by banks and though banks are becoming more comfortable with cloud architectures, these are still issues.

Security has become less of a concern. Only a few years ago, a then CISO at Goldman Sachs put it like this: “The security of cloud platforms like Amazon, Google, Microsoft and others is concern to us, not least because we use end-to-end encryption internally, but for any institution smaller than us or our peer group, I can’t see that they wouldn’t be more secure inside one of those environments – they block thousands of intrusion attempts every minute of the day. It’s part of the air that they breathe.”

Tink’s van Vonno says that their clients are, unsurprisingly, highly demanding in this area. “We are exposed to penetration testing every single month. A big enterprise, or a big bank that would like to leverage our technology will make sure that our technology is rigid. They will have White Hat hackers trying to penetrate our systems, trying to socially engineer our developers to provide access and to see if they can enter the systems by different means,” he says. “We often find clients realising that our technology, and the way we built our technology, on cloud infrastructure, is more secure than what banks have in house. We have organised our engineering culture and our different levels of authentication and access to prevent any unauthorised access or intrusion from happening.”

Clearbank’s Harris agrees but points out that it is not enough to rely on the cloud service provider to be totally responsible for your security. “There are still plenty of things you can do that would create risk – if you leave all your ports open you can hardly blame Microsoft for a breach.” ING’ Meijs is characteristically blunt: “I’m not hearing as many real worries about security and public cloud,” he says. “But, then again, there is the risk of using it, which is [about] how well the security is protected and designed … you can still open up the firewall to North Korea, fully automatically, with no guarantee it will go right.”

Of more concern is regulation. Where hybrid cloud is concerned there are particular regulations relating to operational resilience, among them the guidelines of the US Office of the Comptroller of the Currency (OCC) and the proposed European Digital Operational Risk regulation (DORA) that specifically address the potential risks involved in cloud-based solutions, and the responsibilities of financial institutions to show that they have mitigation controls in place.

Standard Chartered's Athaide says that hybrid cloud can mitigate some operational risks: "Being part of a regulated industry with a presence in multiple jurisdictions, a lot of what you can or cannot do is governed by the regulators that supervise the industry. We started out with one cloud service provider and subsequently added a second. Going forward perhaps there may be another one or two. From a strategic resiliency perspective, it is better to leverage more than one cloud service provider should the need arise to migrate workload."

The compliance and operational risk practitioner quoted earlier, says this is an old problem in a new guise: "To me it is like a new way of outsourcing, and you have to approach it with the same rigour that you would take to any outsourcing arrangement."

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>
> REUBEN ATHAIDE, HEAD OF CYBER SECURITY AND DEVSECOPS, STANDARD CHARTERED BANK

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OPEN SOURCE

An important part of hybrid cloud is the role of open source software, but concerns remain about how best to exploit this, particularly when it comes to active participation in open source communities, where interviewees for this survey expressed a high degree of caution.

On the upside, all see benefits from open source, but have reservations. "In some cases, yes, it very much is part of the decision process," says the London bank's chief architect. "Going back to the example of rolling out services across different geographies, open source helps in two ways: sometimes deployment will involve multiple cloud service providers, so there is the portability issue. It also goes some way to helping solve issues around providing centralised support to multiple countries."

Standard Chartered's Aithaide says "I work in a regulated industry in which historically there has been some uncertainty on adopting open source technologies" but adds that the bank has deployed open source technologies "such as Kubernetes, Istio, Kafka, Mongo DB, in particular" because it is the best way to achieve the promise of cloud architecture.

"The motivation to move to the cloud is agility, scale and velocity – ultimately to deliver value to the customer faster and better," he says. "Embracing modern software architectures whilst adopting cloud breaks down monolith applications into microservices that can be run on multiple cloud service providers and/or on prem, which in turn aligns to the motivation/business goals," he adds.

ING's Meijs splits the question in two, taking a different perspective for public and private cloud environments. "If we are reusing a cloud native application that just connects a couple of services that are already there, whatever flavour Google or Azure use to connect to their containers, data analytics or databases, it can be open or closed. I wouldn't care because it is all in their hands. I want to take a managed service, and I call an API. That's all I do" he says. "But on the private cloud, for us it's totally different because there is a big difference in costs. In the public cloud, I just wanted to use a service, and

they can use open source to make it easy. But if I want to get the service on the private cloud, I pay for licenced software. If I can get that open source that's much more interesting, although we all know there's still a difference between open source and free open source and licenced open source or supported open source. We do a lot with a lot of open source tooling [with specialists]. But we are still paying the maintenance and support on that."

Athaide says: "it all depends on the type of open source product and the level of abstraction. At the moment in [our] journey, we have used open source software for databases, middleware, and operating systems, but not all applications have the same level of importance or criticality, which is a consideration on the type of open source software that may be permissible."

He points to issues in support for critical workloads and points out that the bank also has formal policies to govern usage, along with technology standard review groups, which mean "to take the next step and contribute to open source we need to work through some challenges as relates to compliance and security for the development community and potential brand risk."

He adds that many financial institutions, including Standard Chartered, have venture arms that are actively co-creating with fintechs and start-ups that perhaps means they are indeed contributing back to the community "That said," he says, "for me security is job zero. Hence it is an evolution and we aren't there yet to contribute to the open source community."

A wide range of financial institutions have made public statements about their participation in the open source community, including investment banks like Goldman Sachs, which released its proprietary data modelling program, Alloy, to the community several years ago while the likes of JP Morgan, HSBC, Deutsche Bank have also been active in this area.

However, the jury is still out on how far regulated enterprises can participate in the community side of open source development, says Meijs. ING has pushed the open source agenda to a great extent but found that for critical systems, situations arose that meant the bank was "way too slow in our updates, meaning we were lagging behind on the community level and then there's nobody supporting you anymore".

He is optimistic, however, that this approach will be increasingly adopted, but it won't be any time soon. "If you truly do this, you need to heavily invest in giving back to the community," he says. "And, obviously, you have to be part of a community that is not where we traditionally have been, so it will take quite some while."

Tink's van Vonno says that the question is also asked in the developer community. "We are a big user of open source, and we have some genius engineers at Tink that are doing amazing stuff with the technology, but at times, we are asked the question, should we open source what we have built and make it available to the community?", he says. "We have to talk about this, it is very culturally driven: we have an engineering culture that swears by the use of open source technology. So far, it has not conflicted with any of our conversations with enterprise banks."

He also thinks that this discussion will soon be a thing of the past "because cloud computing has been made successful by open source, technologies, such as Kubernetes, such as Docker, such as analytics technologies like Cassandra, and languages like Python – these are all open source technologies and that's a large part driving the cloud community."

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> WOUTER MEIJS, GLOBAL HEAD OF CLOUD, ING

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CONCLUSION

Financial institutions of all types are now well along the path towards a future where hybrid cloud environments are the norm and are the basis of a stable architecture that balances multiple organisational needs.

FSIs need the hybrid cloud because they can't push everything into the public cloud, for a variety of reasons – including the fact that the public cloud would be too expensive for some bank-specific applications.

That means they need to have a sort of boundary between private and public cloud, with true cloud-native apps on the public side and those that can be guaranteed as enterprise-class on the private side, with residual on-prem systems also in the mix.

The objectives and the outcome are much clearer now than when FIs first embraced cloud architectures, with clearer objectives among different parts of the institutions. As Athaide says: "Initially when starting out on the journey there was a lot of effort put into building awareness with technology teams (developers and operations) as a grassroots movement: Subsequently the outreach has widened to target business groups."

For Bloor's Terrar, the journey to hybrid cloud is part of a much larger transformation that is changing the way that businesses of all kinds, not just FIs, will operate. He points to a four-point mantra cited at last year's IBM Think event by Jim Whitehurst: "Data is the fuel, hybrid cloud is the platform, AI is the accelerant and insight is the outcome."

ING's Meijs, who says that his bank is planning to be 90% on cloud – both private and public, has a different pithy summary: "The main reason we are doing this is to make life easier for our developers. We want to make the infrastructure invisible for them."

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ABOUT

Finextra

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