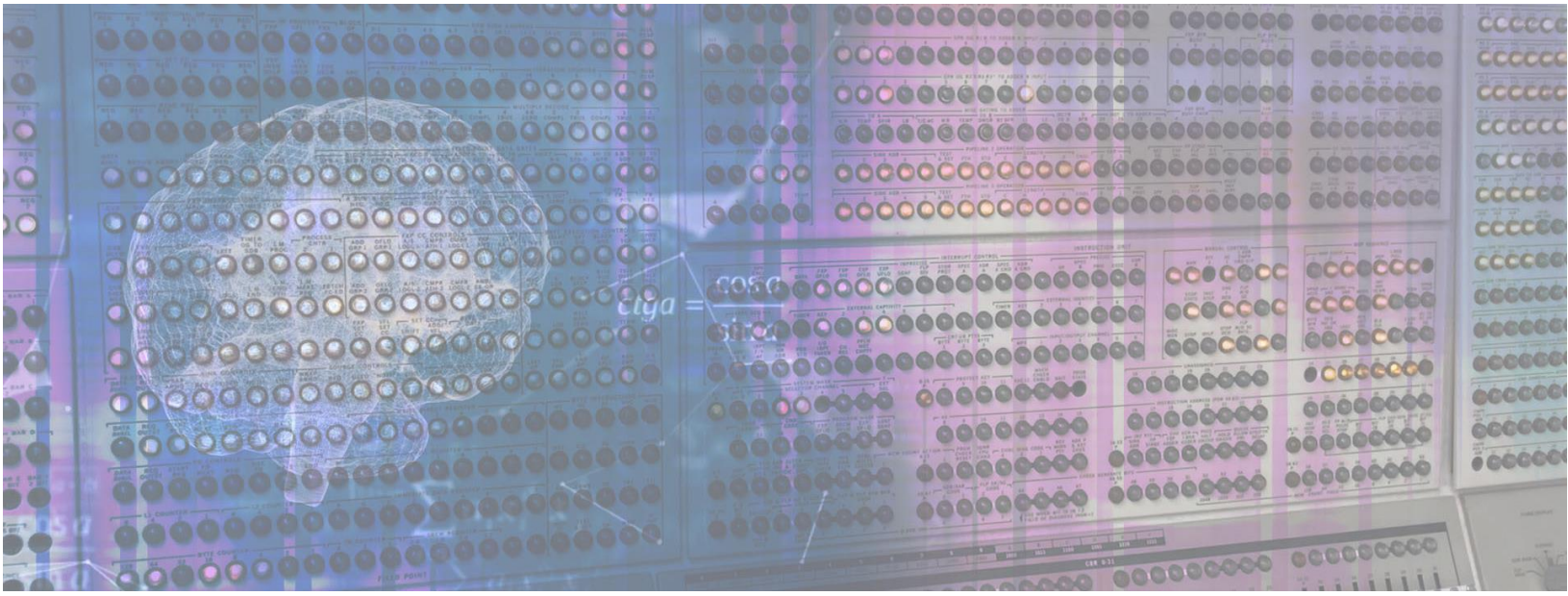

Building a New Kind of Enterprise Application

Global Hybrid Multicloud Applications are Revolutionizing Enterprise IT

An Intellyx Whitepaper for Fiorano
by Jason Bloomberg, Managing Partner
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There is a new type of enterprise application that is cloud native and event-driven, running on hybrid multicloud architectures across distributed geographies. We call this type of app a Global Hybrid Multicloud Application (GHMA).

GHMAs must be both massively scalable and dynamic – cloud native characteristics that are difficult to achieve in hybrid multicloud environments. They must also be event-driven, high performance, and highly available.

Fiorano provides the infrastructure necessary to deliver all the features of GHMAs and more. By leveraging its category-defying peer-to-peer integration infrastructure, enterprises of all sizes can implement and deploy GHMAs at scale, while leaving the details of the implementation to Fiorano.

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Why We Need a New Kind of Enterprise Application

Enterprise computing has been through five paradigm shifts since businesses first started using digital technologies in the 1950s. Mainframe, client/server, Web/n-tier, cloud, and now cloud native – each paradigm represents a new approach to software architecture, IT infrastructure, and most importantly, enterprise applications.

Today, the latest installment in this story, cloud native computing, is reaching sufficient levels of maturity for both large and small enterprises to rethink their approach to IT infrastructure. As that infrastructure stabilizes, the focus naturally shifts to the sorts of applications organizations can build upon it.

Technology serves as an enabler, opening up new possibilities for organizations seeking to remain competitive, improve their bottom line, and in the public sector, efficiently accomplish their mission.

Technology, however, never drives the creation of applications. Business needs – and by extension, end-customer needs – lead to the development and deployment of new types of applications. Technology serves as an enabler, opening up new possibilities for organizations seeking to remain competitive, improve their bottom line, and in the public sector, efficiently accomplish their mission.

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Furthermore, none of these broad technology trends fully displaces the ones that came before. Mainframes are more powerful than ever. Web sites aren't going away. And the cloud, of course, is firing on all cylinders.

Most enterprises, therefore, find themselves in a quandary: how to take advantage of the most modern of technologies to address today's business challenges, while simultaneously leveraging existing IT assets that remain useful and cost-effective?

Today's business challenges, in turn, are driving rapid application innovation in this hybrid context that many organizations struggle with. In particular, such challenges are likely to include:

- *Massive scale* – More users, more data, greater interactivity, and AI-based innovation drive organizations to build applications that can serve every need for every user on a 24x7 basis.
- *Dynamic capabilities* – Customer needs evolve. Employees require new capabilities. Application development must proceed at a rapid pace, often with development teams working in parallel. All these forces drive organizations to build applications that are inherently flexible and dynamic.
- *Global scope* – Even when an organization is located in a single country, customers and employees can be anywhere. Applications must perform accordingly.
- *Hybrid* – Enterprises must leverage a mix of on-premises infrastructure and one or more clouds, as well as older and newer technologies, to achieve business goals in a timely, cost-effective manner.
- *Real-time* – Nobody likes to wait. Everyone wants current data and real-time interactivity, with no lags and no latency. Mere seconds of delay can mean the loss of millions of dollars.

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- *Regulatory compliance across all jurisdictions* – Data sovereignty drives many modern applications. The rules for where organizations can put data and what they and their users can do with them vary by location.
- *Digitally transformed processes* – Enterprises are rethinking how they serve customers as well as employees by revamping their organizations as well as their technology estates – a trend we call digital transformation. Digitally transformed processes make such transformation a practical reality.

Different organizations face different challenges. Some of them face only a subset of the above challenges. Nevertheless, an increasing number of enterprises need their applications to check all these boxes.

Enterprises around the world are all-in on this new type of application. For want of a better term, let's call this new type of application a Global Hybrid Multicloud Application *(GHMA).*

Such applications fall squarely in the modern cloud native paradigm, as it has only recently been possible to build such apps. But now that it is possible, enterprises around the world are all-in on this new type of application.

The Global Hybrid Multicloud Application

For want of a better term, let's call this new type of application a *Global Hybrid Multicloud Application* (GHMA).

To implement such applications, GHMAs must be a combination of most of the following characteristics:

- *Cloud native* – Today's cloud native applications depend upon the Kubernetes microservices orchestration platform, but the full breadth of cloud native computing extends well beyond Kubernetes to include serverless, edge computing, and an abstracted approach to on-premises technology assets. The goal: massive horizontal scale and dynamic software capabilities, delivering both millisecond-scale elasticity as well as rapid development and deployment.
- *Geographically distributed* – GHMAs run in multiple environments in many locations, depending on the specific business need. Perhaps an organization deploys applications in a multi-cloud environment. Sometimes on-premises assets are part of the mix. In addition, data sovereignty concerns may mandate the geographic distribution of application components.
- *Hybrid* – GHMAs leverage a mix of different environments and technologies. More than simply 'heterogeneous,' hybrid denotes an intentional combination of one or more clouds (public or private) as well as the inclusion of on-premises, sometimes legacy assets. This intentionality gives organizations a control plane that provides visibility and management into all facets of the hybrid environment.
- *Asynchronous and event-driven* – Because GHMAs consist of multiple geographically distributed components, interactions among these components as well as between them and other parts of the IT infrastructure must be asynchronous and event-driven to achieve the performance necessary, in spite of the fact that networks and other infrastructure are not as reliable as they should be.
- *Highly available* – Typical distributed, cloud-based environments depend upon resiliency: the ability to recover rapidly from failures. GHMAs must be resilient, but resiliency is no longer sufficient. Today's enterprises require high availability

as well, in order to deliver a seamless experience regardless of underlying technical issues.

- *Collaborative and Process-centric* – GHMAs are not the 'click a button, get a result' applications from earlier paradigms. Rather, they support multiple people working together, collaborating in real-time as appropriate as well as routing work and data among themselves and various parts of the organization. In other words, the business process is the central interaction pattern.

It should be clear from the list above that implementing GHMAs is a tall order. Not only must teams work across geographically distributed hybrid landscapes, but the application infrastructure necessary to build and support such applications must be in place as well.

Few application infrastructure products on the market fill all the requirements for building Global Hybrid Multicloud Applications. Kubernetes may be a prerequisite but is only part of the story. Many of the challenges implementing GHMAs are integration-related, but integration middleware alone is also insufficient.

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Fiorano: A Platform for Building GHMAs

One vendor that stands out for its ability to support the construction and operation of GHMAs is Fiorano.

In an increasingly distributed and multi-cloud world, Fiorano enables enterprises to build and run GHMAs to address the most rigorous of business requirements for scale, availability, and global functionality.

Fiorano's unique distributed peer-to-peer, cloud native architecture delivers unprecedented reliability, availability, and scale for complex, process-oriented applications – in other words, GHMAs.

Fiorano combines the best features of hybrid integration platforms, cloud native low-code platforms, and enterprise platform-as-a-service offerings to empower customers to build massively scalable, cloud native applications/GHMAs that support global processes while respecting data sovereignty and data gravity challenges.

Fiorano serves as an application orchestration layer above Kubernetes, tying together diverse, distributed application resources into event-driven applications that run across hybrid multicloud environments.

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support global processes while respecting data sovereignty and data gravity challenges.

In fact, Fiorano differs from eiPaaS in that it can run in any cloud, any flavor of Kubernetes, or on-premises – and furthermore, connects these diverse environments into a single application infrastructure.

Fiorano also differs from hybrid integration platforms (HIPs) because it provides a cloud native application construction capability via the composition of microservices on a visual canvas. Integration is at the heart of Fiorano technology, but it's a means to an end – the end being GHMAs.

Fiorano's peer-to-peer architecture is particularly well-suited for streaming data and other types of asynchronous interactions, necessary for the construction of real-time hybrid IT systems. In fact, Fiorano is particularly performant for distributed messaging use cases like multi-step integration flows at scale, for example, updating healthcare patient records across a geographically distributed healthcare network.

Fiorano's peer-to-peer architecture is particularly well-suited for streaming data and other types of asynchronous interactions, necessary for the construction of real-time hybrid IT systems.

One of the leading open-source projects on the market today for delivering streaming data is Apache Kafka. Kafka, however, is overly complex and suffers from performance issues at scale – limitations that the Fiorano platform's peer-to-peer architecture resolves.

In fact, Fiorano is particularly performant for distributed messaging use cases like multi-step integration flows at scale, for example, updating healthcare patient records across a geographically distributed healthcare network.

The reason Fiorano is so adept at supporting such GHMAs is a combination of its distributed peer servers and the configurable event streams that link the peer servers to microservices.

It's possible, for example, to distribute peer servers across clouds, cloud instances, or on-premises data centers – and the peers automatically take care of traffic amongst themselves.

The application team must simply specify the event streams between microservices, either by specifying routes or using a publish/subscribe model. Fiorano then automatically routes streaming data from one microservice to its destination microservice across the Fiorano network.

Fiorano thus has many of the features of eiPaaS and HIP, as well as projects like Kafka – but delivers more than any of them, because its peer-to-peer approach provides both cloud native integration as well as a platform for building high-performance, distributed applications.

Examples of GHMAs

Fiorano has been around for many years and has numerous successful implementations of GHMAs under its belt. Here are a few examples.

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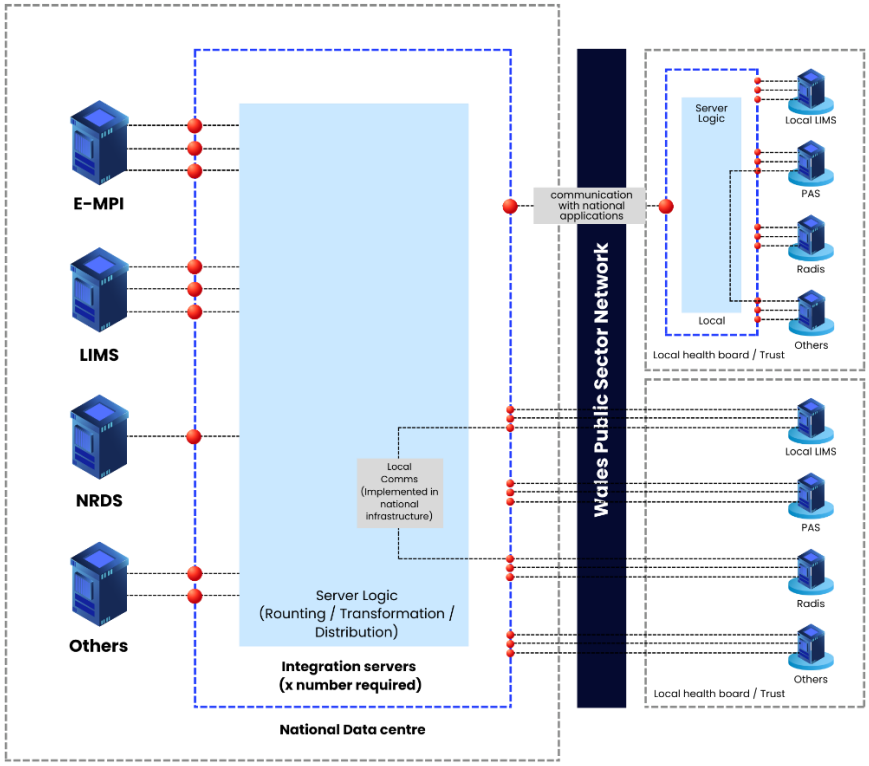
NHS Wales

NHS Wales is one of the four systems which make up the National Health Service in the United Kingdom. To serve its constituency of hospitals, labs, physicians, and others, NHS Wales required a comprehensive, distributed messaging fabric – in other words, a GHMA.

At the center of NHS Wales's GHMA is an integration engine that consists of several Fiorano Peer Servers (labeled as Integration servers below) that automatically transmit messages to each other. The integration engine supports asynchronous, reliable interactions with several external systems across the Wales public sector network, as the following diagram illustrates.



NHS Wales Integration Engine (source: Fiorano)

The NHS Wales GHMA allows for custom interfaces with a variety of third-party systems, including the Welsh Clinical Portal, the Test Requesting and Results Reporting service, and several others. Some local health boards prefer to host and manage their own Peer Servers, while others rely on the national data centre to host them.

This flexibility with the deployment of the Peer Servers is one of Fiorano's primary differentiators. NHS Wales can increase the number of servers as necessary, in any of several locations. The Fiorano infrastructure automatically takes care of their integration, availability, and scalability.

Yle

Yelisradio (Yle) is Finland's nearly century-old national public broadcasting company. The Yle GHMA takes rich media data from various content producers, including news stories and other media content, and streams them to various in-house systems and integration points.

Once the content is on the Fiorano peer servers, they stream the content via multiple parallel streams into the cloud in an event-driven, concurrent manner. Most of the GHMA resides in the Yle data center, with the addition of AWS for storage.

The Yle GHMA is the single largest implementation of Fiorano globally, with over fifty peer servers in production, each running from ten to 200 microservices in parallel for maximum scalability, throughput, and real-time performance.

Rich media assets like broadcast-quality video have stringent infrastructure requirements, necessitating the purchase of expensive, proprietary gear. Fiorano addressed this challenge for Yle, giving it the advantages of high-performance, high-volume streaming data cost-effectively, while also providing an infrastructure that can easily grow over time.

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The Intellyx Take

The definition of a GHMA is not as clear-cut as this paper might lead one to believe. In reality, GHMAs come in different sizes with different requirements and levels of geographic distribution.

The primary way to determine that the application you have in place or want to build is a GHMA is when it doesn't fit neatly into other application types.

Many organizations have built applications consisting of microservices on top of Kubernetes, either on premises or in the cloud. That fact alone doesn't qualify an app as a GHMA.

There are also numerous examples of real-time, event-based, streaming apps. Many such applications also leverage distributed environments. One might designate these as GHMAs, but if they are not cloud native, then they fall on the periphery of the definition this paper provides.

Another application type is the fully hybrid application, especially in multi-cloud environments. Enterprises are uncovering various reasons to implement such applications across clouds, either to take advantage of each cloud's specialty or to optimize cloud spend.

An application would fall solidly under the definition of GHMA if it satisfied more than one of these conditions. Perhaps it is real-time and event-based on Kubernetes. Another GHMA might be fully hybrid and event-based. Or perhaps it is fully hybrid while leveraging Kubernetes, perhaps in more than one environment.

Regardless of the specifics of your particular GHMA, running it on Fiorano can give you a leg up on any of these requirements, while taking care of the underlying integration details with its peer servers delivering scalability and high availability – an advantage over building apps using eiPaaS, HIPs, or enterprise low-code platforms could deliver on their own.

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About the Author

Jason Bloomberg is the founder and managing partner of enterprise IT industry analysis firm Intellyx. He is a leading IT industry analyst, author, keynote speaker, and globally recognized expert on multiple disruptive trends in enterprise technology and digital transformation.

He is #13 on the *Top 50 Global Thought Leaders on Cloud Computing 2023* and #10 on the *Top 50 Global Thought Leaders on Mobility 2023*, both by Thinkers 360. He is a leading social amplifier in Onalytica's *Who's Who in Cloud?* for 2022 and a *Top 50 Agile Leaders of 2022* by Team leadersHum.

Mr. Bloomberg is the author or coauthor of five books, including *Low-Code for Dummies*, published in October 2019.

About Fiorano

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