White Paper

EVOLUTION TO CLOUD 3.0 AND ROADMAP FOR ADOPTION

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EXECUTIVE SUMMARY

Emerging Cloud 3.0 technologies will disrupt application development in organizations across all industries. Companies in the life sciences and financial industries in particular are well positioned to leverage Cloud 3.0 to differentiate themselves by applying artificial intelligence to big data. To take advantage of Cloud 3.0, CIOs and CTOs must deploy a new enterprise architecture and upgrade their processes and technologies. For companies that adopt the new design patterns for Cloud 3.0, the developing economy of commercial-grade web services can accelerate the time-to-value of IT investments, as well as improve quality and reduce costs.

CLOUD GENERATIONS 1-2-3

Prior to Cloud 1.0, business process applications required large upfront investments in infrastructure and large-scale IT operations. Cloud 1.0 disrupted this with SaaS (Software as a Service), which offered à la carte standard business process applications with no upfront investment.

Cloud 2.0 followed, disrupting the IT infrastructure for application development with offerings ranging from IaaS (Infrastructure as a Service) to PaaS (Platform as a Service). Prior to Cloud 2.0, developers had to manage everything from hardware to databases and web servers. After using IaaS for big data, organizations started to realize the benefits of using servers in the public cloud for other applications too. This drove the demand for PaaS offerings including managed databases, application servers and web servers, as well as integrated software development, deployment and application management environments. Yet, developers still had to configure and control most of the components of the application. This is where Cloud 3.0 is creating the next wave of disruption.

With Cloud 3.0, developers build High Availability (HA) and Massively Parallel Processing (MPP) applications by decomposing the software into loosely connected subcomponents called microservices. When microservices cover a common use case (such as a credit card payment in an e-commerce application), developers can use a ready-made commercial-grade web service instead of building, running and maintaining new code. For functionality that must be created, developers can use FaaS (Function as a Service, otherwise known as serverless or lambda) to bring code and data to platforms where a hyper-convergent infrastructure virtualizes all layers (i.e., software-defined "everything" from networks and storage to servers, databases and applications). In Cloud 3.0, libraries of code are a thing of the past. Instead, developers invoke web services which are libraries of code along with the necessary infrastructure to compute and store data. To support these web services, cloud providers deploy workload management systems that are application aware and use Machine Learning (ML) to scale infrastructure on demand and to route compute and storage requests to specialized hardware.

ROADMAP TO ADOPTING CLOUD 3.0

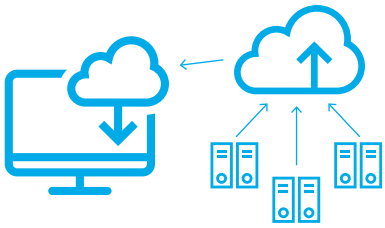
As organizations adopt Cloud 3.0, they will experience a change in the application development culture. 80% or more of the application development effort will go towards the use case rather than infrastructure and software development. At the same time, domain subject matter experts, rather than software developers, will develop applications.

Evolution to Cloud 3.0

Full Stack Programming

Infrastructure, Application and Integration

Application Programming



Application and Integration

Web Services Orchestration

API Integration

While new technology waves can be overwhelming for IT organizations, a few simple steps can position them for success. The first step in the journey to Cloud 3.0 is to reengineer the enterprise architecture process. In Cloud 3.0, the enterprise architecture becomes a map of web services and microservices with their constraints and interdependencies. The build/buy decisions are now made at the microservice level, based on factors such as: intellectual property or trade secrets, cost, time to market, ability to execute, what microservices are core to the business and what microservices are part of offerings or used for internal business processes.

The next step is to encourage early adopters to consume web services from established commercial providers. This is the beginning of the transformation in application development culture. Developers will use more and more ready-made web services, and application development will be faster and faster. This will allow more time and resources for the actual use cases. Success will breed success, and more groups will adopt Cloud 3.0. Then more vendors will offer web services. As they compete, the prices will drop, which will make application development even more cost effective. When Cloud 3.0 reaches maturity, a large percentage of cloud offerings will be developed and consumed as web services.

The transition to Cloud 3.0 will take place quickly, albeit with some bumps in the road. Although dealing with infrastructure and application environments will soon be a thing of the past, technology professionals will have to face new challenges. Web services and microservices inter-communication, as well as latency and network load, will continue to drive location decisions. Given the volume, velocity and variety of the data (the 3 V's), some web services will be deployed on the network edge while others will be deployed in the core network. Debugging and incident response will be exponentially more complex compared to monolithic on-premise systems. Security and privacy for systems composed of highly distributed microservices will require new types of tools and design patterns.

As organizations adopt Cloud 3.0, domain subject matter experts, rather than software developers, will develop applications.

CONCLUSION

Cloud 3.0 is not a futurist prediction; it exists today in nascent forms. Industries with massive and complex data and significant computational requirements (such as life sciences and financial) are ripe for disruption. Using Cloud 3.0 technologies to build applications faster and at a lower cost allows organizations to focus their resources on domain subject matter experts who can design and guide supervised and unsupervised artificial intelligence on big data. This shift in development patterns represents a significant opportunity for disruptive innovation that will fundamentally change the market landscape.

ABOUT THE AUTHOR

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Navdeep Alam brings more than 19 years of experience in software engineering, databases/data warehousing, analytics, architecture and development to his role as the Senior Director, Global Data Warehousing. Nav is charged with managing the Global Data Warehousing organization as a Center of Excellence for IQVIA, and driving to define and execute its future roadmap, including the next-generation Massive Parallel Processing (MPP), PetaByte scale, low-latency Data Lake systems, including our Hadoop infrastructure, as well as our Hybrid Cloud architecture for IQVIA Human Data Science Cloud.

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