White paper

The evolution of hybrid cloud management

From uncontrolled sprawl to a unified, adaptive IT services architecture

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Atos

As cloud has moved from the leading edge to the mainstream, the requirements for cloud management have evolved. Enterprises need an agile framework that will allow them to integrate multiple cloud environments seamlessly and update them quickly as business and technology requirements change. Many organizations are now integrating artificial intelligence and machine learning into their hybrid cloud environments. This approach allows digital enterprises to rapidly develop and deploy new features that change the way they interact with customers, suppliers and partners, enabling them to create new, innovative business services.

This paper looks at the key components of a hybrid cloud management strategy, and the capabilities Atos and ServiceNow are developing to support enterprises as they enter the next phase of digital transformation.

Cloud computing is rapidly becoming the predominant IT service delivery mechanism as more enterprises realize its potential for digital transformation. However, as organizations evaluate different cloud platforms and configurations, it has become apparent that there is no "one size fits all," even for multiple business units within the same enterprise. IDC estimated that in 2017 more than 85 percent of enterprises would commit to multicloud architectures "encompassing a mix of public cloud services, private clouds, community and hosted clouds." Different cloud solutions offer different strengths and weaknesses depending on which criteria are most important—cost, security, scalability, speed of implementation or other factors. And most companies, unless they are "cloud native" or "born in the cloud" startups, will also need to integrate and leverage existing legacy applications that may not be suitable for today's modern cloud platforms.

Current conditions: cloud sprawl

One of the biggest impediments to strategic management of cloud environments is "cloud sprawl," which occurs when cloud computing resources are permitted to proliferate with insufficient governance. As with many emerging technologies, cloud has not always been implemented as part of a cohesive, orchestrated, end-to-end strategy. Early forays into cloud were piecemeal, sometimes starting out with trials in one area of the business. Different departments and lines of business within companies have implemented different cloud strategies to fit their individual needs; the resultant infrastructures may be in silos with little to no communication between them. Researchers have found that enterprises on average use five public or private cloud platforms and anywhere from 300 to 3,000 cloud services, and that "'shadow' or rogue cloud usage…is often 10 times larger than IT organizations' estimates."

The lack of visibility into cloud usage puts CIOs and CFOs at a disadvantage because they have no idea whether cloud resources are being used in accordance with company strategies and policies, or whether they are optimizing the use of these resources:

- Unnecessary operational complexity is introduced and services may be redundant;
- Workloads can't be transferred between clouds to improve efficiency;
- Security measures and regulatory compliance can't be enforced;
- Departments can't coordinate purchases to get optimal pricing from suppliers;
- Consolidated information for performance and usage analysis is unavailable.

Aligning cloud with business objectives

Now that cloud has been widely adopted for business-critical applications and services, it requires a focused approach to management. Managing the cloud is not just about technology; it's about managing your business.

In order to stay competitive, you need to supply your end users with fast, easy access to the tools they need to create innovative products and services, regardless of where those tools reside. At the same time, you need to make sure those tools are sanctioned by IT, comply with industry regulatory requirements, and are subject to proper governance.

Cloud snapshot:

- By 2020, 67% of enterprise IT infrastructure and software spending will be for cloud.
  - Gartner
- More than 90 percent of enterprises will use multiple cloud services by 2020.
  - IDC
- The average company uses 5 to 6 cloud platforms and 300-3,000 cloud services
  - Rightscale, SkyHigh Networks
- Rogue cloud usage is often 10 times later than IT estimates.
  - SkyHigh Networks

Managing the cloud is not just about technology; it's about managing your business.

Atos and ServiceNow: delivering an agile, integrated and evolving cloud management platform

Atos has worked with customers in every stage of the cloud journey, allowing us to observe the complex challenges involved in implementing cloud and harnessing it to meet business objectives. Based on this experience, we believe the foundation of cloud success is having an integrated management framework that provides a unified view and orchestrated control of all your cloud resources and activities. This is the philosophy behind the development of the Atos Canopy Orchestrated Hybrid Cloud platform, a common framework for orchestration and management of complex landscapes of private and public clouds and legacy infrastructures, along with a comprehensive suite of managed and digital services.

Core to Atos' cloud management strategy is ServiceNow. This service management platform provides a key component of the Canopy service orchestration and management layer, which sits between the multiple clouds and the applications running in these environments. As a market-leading solution for IT services management for both legacy and cloud systems, ServiceNow was already in use by many of Atos' customers and was a natural choice to provide this crucial functionality. The services layer reduces complexity for developers by allowing them to connect with multiple clouds through a common set of APIs, which are integrated natively with the services offered by today's leading cloud providers. It is designed to promote standardization and interoperability rather than requiring customization for each cloud environment. An API can be presented to ServiceNow or to developers, so they can create their own service catalog or leverage our standard cloud catalog from ServiceNow.

The latest release of ServiceNow contains a number of enhancements that strengthen cloud management automation and oversight. These include a new cloud admin portal, greater visibility and control over cloud spending, natural-language workflow creation for non-technical users, machine learning to improve functions such as provisioning; greater automation of security procedures, and the ability to predict potential incidents.

Fig. 1, Atos Canopy Orchestrated Hybrid Cloud, Delivering enterprise services across a range of platforms

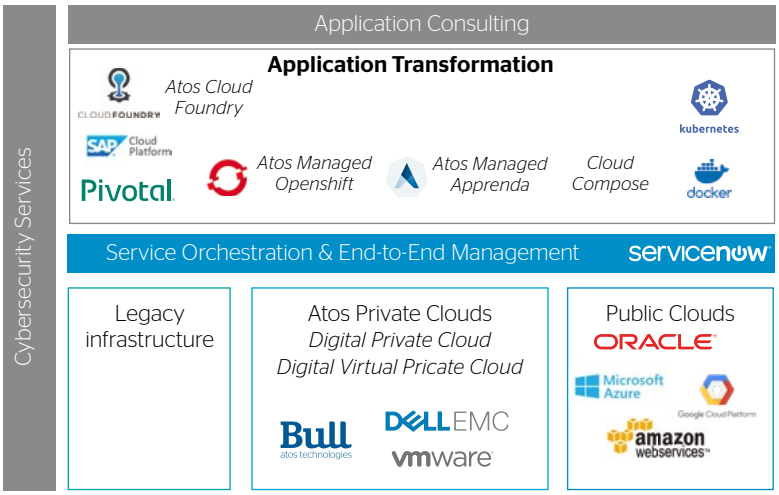
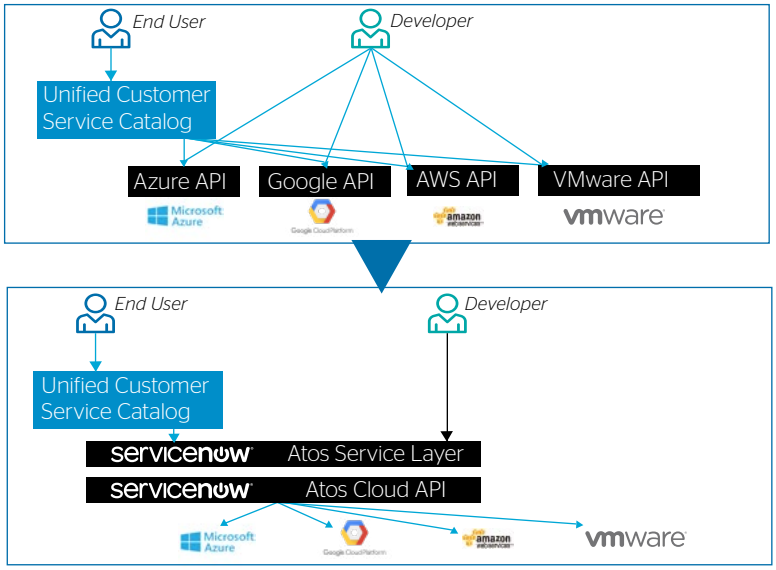


Fig. 2, Achieving Portability through simplicity. Transforming cloud provider infra APIs to Service APIs



Next-generation hybrid cloud management enables:

- **Agility and responsiveness:** Workloads can be moved between different cloud platforms, and resources such as virtual machines can be rapidly added, removed or modified as requirements change; new IT applications and services can be rolled out quickly and securely at scale; new assets can be deployed quickly, achieving shorter time to value; new functions or processes can be implemented once rather than repeating for each cloud environment.
- **Cost control and accountability:** IT and business managers can identify who is using what amounts of which resources; usage can be controlled by building approval requirements and limits into workflows.
- **Transparency across business units:** IT and business managers can get a better picture of technology usage across departments; resource usage can be coordinated so that assets are optimized; consolidated information is available for analytics and strategic planning.
- **Compliance, governance and security:** Business rules, standards, data security requirements, industry regulations and more can be built into your workflows so they are consistently enforced.
- **Operational efficiency:** Automated processes and workflows mean less manual intervention for provisioning workloads, setting up new environments and approving requests; complexity is reduced with only one interface for multiple clouds. This generates cost savings which can be reinvested into innovative new technologies.

What's new with cloud management?

Atos and ServiceNow are continuing to develop new capabilities in support of agile, orchestrated cloud management. Significant new and enhanced features in the following areas are available through Atos Canopy and the latest release of ServiceNow.

Unified viewing, management and provisioning of hybrid cloud resources and infrastructures. End users, administrators and developers can access the resources they need regardless of where and with which cloud provider they reside, using a standard system of actions. Consolidated information on usage comes back to administrators so they can make better business decisions about cloud usage.

Cloud administration portal. A consolidated IT control panel lets administrators manage, govern and design all their cloud services. Instead of looking at multiple catalogs and dashboards from various cloud providers, customers can view them all from a single portal.

Cloud user portal. A self-service portal allows users to request resources from multiple clouds using a standard service catalog, gain visibility into resource costs, quotas and usage, and manage the lifecycle and health of their cloud resources. This capability balances ease of use with governance. Users get on-demand access while IT retains control over the process because possible actions are governed by the rules IT has set for the resources.

Cloud blueprint designer. With cloud blueprints, a typical application scenario can be defined once and serviced by different providers. Developers can take modular, "Lego-style" resource blocks, pull in various components and stack them onto an application blueprint to automatically generate service catalog items and workflows to be provisioned in the cloud. With a press of a button, an entire application scenario can be deployed at the relevant infrastructure based on the rules, profiles and corresponding IT components defined for that service. A user can then order a compute resource such as a server from any cloud provider, be it Amazon, Microsoft, Google, or private cloud resources, and their requirements are translated into the language of that provider.

Standard service catalog. With orchestrated cloud provisioning, business mapping lets you translate business needs into technology. Say, for example, a user needs to start up a new development environment. Rather than specifying technical components such as a server or network, the user can just press a button to order a catalog item, which kicks off a series of workflows to get it approved, provisioned and entered into a database for monitoring and reporting. All this appears the same to the user regardless of the cloud in which the resources reside.

With a service catalog approach, IT productivity is enhanced through a focus on applications rather than infrastructure. It's easy to access applications and capabilities across the large ecosystem of Atos partners.

Have it your way: ***ordering cloud services off the menu with blueprints.***

Imagine you want your staff to be able to order burgers for lunch whenever they want, and you have agreements with McDonald's, Wendy's and Burger King to provide them. You don't know which restaurant will be fulfilling an order at any given time because it depends on their wait times in the drive-through and other factors. You don't want your staff to time spend time on figuring out which fast food restaurant they're getting lunch from; you just want them to quickly order a medium-sized hamburger with cheese and have it translated into "Quarter Pounder," "Single with Cheese," or "Whopper" depending on the restaurant being used. That's the kind of experience developers can create with cloud blueprints. Blueprints create a universal language on one side that gets interpreted by the cloud providers on the other, so that a user can order a compute resource such as storage and memory from Amazon, Azure or Google, and have it translated into the menu of that provider. This simplifies the user's experience and saves time for developers, who can define an item once in a catalog. The vendor-neutral approach can also accommodate many different suppliers. And with the ability of IT to set of policies, it lets companies enforce business rules, so that if you can only order from Burger King because you have a contract, then no matter how the end user states their order, it will come from Burger King.

Automation of workflows and business processes. Cloud environments are so large and complex that it's no longer practical to manage them without automation. Standard sets of processes and workflows can be built into your cloud infrastructures to ensure provisioning is done according to your business rules—automatically and quickly. This reduces risk and mistakes, improves speed to market, and ensures that consistent policies govern use of infrastructure resources.

- Workflow design for business users: A new feature in the most recent release of ServiceNow, the Flow Designer gives non-technical users the ability to create and implement workflows using natural language rather than code so they can more easily automate approvals, tasks and notifications, and record operations.
- Agent intelligence: Machine learning is infused into the newest release of ServiceNow, offering the potential to automate resource provisioning and management. For example, if the system perceives a threat to a server, it could automatically add or change a resource. At first there would be a fixed path defined; then, the machine could learn to create its own path to improve the process.

Compliance, governance and security. By building in business rules to your service catalog and workflows, you can make environments and configurations consistent across different cloud platforms, ensuring that security, compliance and availability requirements are adhered to across the entire ecosystem. The policies that you define make the decision about which APIs get used in which cases; for example, you can enforce a rule that a workload containing country-specific data can't be provisioned or moved outside of the country, or that it has to be deployed on a private cloud to meet regulatory requirements. There also is a compliance module within ServiceNow that records all the changes that have been made to a system or resource and logs them into a document for auditing purposes. This enables customers to potentially meet a variety of auditing requirements, such as FDA compliance.

Configuration management. The Configuration Management Database (CMDB) in ServiceNow helps IT managers visualize interactions between systems, analyze trends and reduce problems and incidents. The CMDB stores, tracks and maps the state of various configuration items (physical entities such as a computer or router, logical entities such as an instance of a database, and conceptual entities such as a requisition service) and represents them in a visual fashion to the user. Scripts, templates, blueprints and transactions all flow back into the CMDB.

This allows administrators to quickly view the impact of an incident; for example, if a bank of disk drives is lost, it takes down a database instance, which affects the requisition service the HR department uses to order new equipment for employees.

- ***Discovery module.*** This module enables rapid implementation of hybrid cloud management, allowing you to connect to multiple clouds quickly in an automated fashion. The discovery process lets you collect data from multiple platforms to view the current state of security, capacity and more, as well as to identify services that have been deployed outside of standard processes. A new "acceleration patch" speeds this process so that within a week a customer can have a beginning framework to which they can add and make changes.

Cost visibility/control. Tracking cloud usage costs is notoriously difficult. Not only do you have to track spending across multiple providers, but the bills you receive from each vendor may not be itemized. Budgeting understandably tends to be reactive rather than controlled in advance. You get a single bill from each supplier at the end of the month for resources, which may reflect usage by thousands of people across many different lines of business, departments, and projects.

To give IT and financial departments more control over cloud spending, Atos and ServiceNow utilize a split bill functionality with tagging capability that identifies who spent what and where and which accounts to charge. This is all integrated in a cloud cost dashboard that centralizes billing information across cloud accounts to provide a complete picture of spending,

With the cloud cost dashboard, IT planners gain consolidated data for cost analysis, allowing them to explore spending across time, service categories, providers, data centers and users. They are better able to allocate cloud resources associated with specific business activities. Spending limits can also be enforced with exceptions made as necessary; for example, with quote management and authorization, if a user is allotted x amount of storage, they will need to get approval upfront before exceeding that amount.

Containerization vs. workloads. The trend continues toward containerization and serverless computing in hybrid cloud environments. There is a shift away from workloads – strictly defined constructs you can point to as residing on certain servers in certain places—toward services. This shift is supported by the use of containers to break applications into smaller parts; the services comprising an application are "packaged" to become portable across different physical and virtual infrastructures.

With containers, developers can build and deploy portable applications that can run anywhere, with minimal changes required to redeploy them across different cloud and service providers. The service provider handles all of the service-side IT. You may be running functions that are deployed in a container that persists until your function has done its job, and then disappears. All of this contributes to increased agility and transparency.

Long-range cloud forecast

As we move toward a "cloud native" world, there is growing recognition that "getting software to work in the cloud requires a broad set of components that work together. It also requires an architecture that departs from traditional enterprise application design."

The next generation of hybrid cloud implementations will be characterized by greater automation and increased use of artificial intelligence and machine learning. Atos will leverage tools such as Google Cloud's Machine Learning algorithms and APIs to enable faster and smoother adoption of AI capabilities for cloud management. There will be continued advances in these areas, with the ability to make forward-looking decisions based on the information the system is providing.

Initial cloud deployments are becoming highly automated, with the ability for a user to log in and press a button to deploy a service or application. Further process automation will mean that even less intervention is required; for example, deployment or operation calls can be integrated into the software to manage the business flow without a user entering requests into a portal.

Greater levels of integration with Kubernetes for container orchestration will be another significant trend in the next generation of cloud management. While containers offer clear advantages in portability across cloud infrastructures, they lack core service management capabilities. Kubernetes provides an open-source and thus more cost-effective system for deploying, scaling and managing containerized applications. The approach handles the work of scheduling containers onto a compute cluster and manages workloads to ensure they run as the user intended.

Kubernetes has achieved wide market acceptance due to its architecture, innovation and the large open source community around it. Atos will continue to develop its Hybrid Cloud Management Platform to enable container orchestration using Kubernetes, Google Kubernetes Engine, Docker and other tools that make it easier for developers to create and manage cloud-native applications.

Back down to Earth: the human side of cloud management

Automation and technical orchestration are crucial pieces of the cloud management puzzle, but true digital transformation also requires attention to people and processes. A successful cloud strategy requires new ways of thinking and a reevaluation of existing ways of doing business. The complexities and fast-paced change of today's environment necessitate a more automated and disciplined approach, with templates that encapsulate business rules and standards but also provide flexibility to change directions quickly.

To realize the benefits of new agile technologies, companies need to move beyond the old business models with siloed teams and systems. Network, R&D and application teams need to be more aware of each other's activities and more interconnected, just as their systems are. Atos has the experience and processes to consult with enterprises and help them manage this journey.

Why Atos and ServiceNow for orchestrated hybrid cloud management

Atos and ServiceNow are collaborating to achieve continuous improvements in cloud management and service orchestration, including the integration of artificial intelligence and machine learning products into the ServiceNow platform. This approach automates how organizations develop and deploy new features that change the way their customers, suppliers and partners interact with them, enabling their digital transformation journey. For ServiceNow customers, Atos not only provides an ecosystem of products and services that can be readily deployed, but also a dynamically managed platform that can support all of their infrastructure and applications workloads securely at scale in the cloud.

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Michael Kollar is responsible for development and implementation of the Atos global strategy for cloud, automation and other emerging technologies. Throughout his career, he has helped numerous Fortune 500 organizations achieve market leadership and growth in their respective segments through the aggressive use of existing and emerging technologies.

For more information:

atos.net/en/solutions/atos-canopy-orchestrated-hybrid-cloud

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About Atos

Atos is a global leader in digital transformation with approximately 100,000 employees in 73 countries and annual revenue of around € 13 billion. European number one in Big Data, Cybersecurity, High Performance Computing and Digital Workplace, the Group provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting-edge technologies, digital expertise and industry knowledge, Atos supports the digital transformation of its clients across various business sectors: Defense, Financial Services, Health, Manufacturing, Media, Energy & Utilities, Public sector, Retail, Telecommunications and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline. Atos SE (Societas Europaea) is listed on the CAC40 Paris stock index.

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