



Cloud Orchestration and Automation:

How to select the right platform for you

by

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Introduction

As a company's Information Technology (IT) infrastructure moves toward a cloud-like architecture, be it public, private, or hybrid, the need to do more with less continues to increase. Rather than dedicate distinct resources to different functions, such as server administrators, storage administrators, virtualization administrators, and others, IT staff must provide cross-functional administration. At the same time, IT must implement an array of advanced features—chargeback, lifecycle management, service catalogues, and dynamic resource allocation.

To be more effective, many IT organizations are considering software solutions that can provide orchestration and automation to tie the requirements together. To help you evaluate a cloud orchestration platform's potential suitability to your environment, Ahead has identified key factors to consider before making a decision.

Note that orchestration and automation are not interchangeable terms. Automation refers to processes that, because they're repetitive and repeatable, can be programmed to function without manual intervention. Orchestration combines multiple automated processes into a workflow or workflows. Effective orchestration and automation in an IT environment can enhance the economies of scale inherent in cloud architecture.

Is the Cloud Public, Private, or a Combination?

This document examines cloud architectures with regard to an IT organization's environment, specifically the concept of Infrastructure-as-a-Service (IaaS) where the goal of the automation solution is to abstract the management and deployment of virtual machines or physical, bare-metal servers.

Additionally, many automation solutions can manage and interact with private and public clouds. In the context of this document,

private cloud refers to an infrastructure built and maintained by the IT staff; public cloud refers to an infrastructure provisioned by a third-party service provider; and hybrid cloud refers to an infrastructure combining both.

Platform Support

No two infrastructures are exactly alike. Most environments do not have a single server build throughout the data center; indeed, some support multiple hypervisors, using a combination of VMware, Citrix, Oracle VM, and Hyper-V, among others.

Consequently, part of the evaluation process for an orchestration solution should be a review of the server platforms and hypervisors within current and future environments. Is the server platform of choice Cisco Unified Computing System (UCS) or a combination of Dell and HP blades? Is the environment of the future meant to run exclusively on VMware's hypervisor?

The tighter the integration between the orchestration tool and the server vendor, the easier provisioning will be. Automation and orchestration for both physical and virtual environments will be an absolute requirement for some environments, even if all "systems" to be managed are virtual machines. Rolling out new hypervisors continues to require some integration with the physical box.

Chargeback

In a cloud infrastructure, where IT can act as an agile and elastic provider of business enablement services, supplying some level of chargeback or showback functionality to individual business units is critical.

Rather than being viewed solely as a cost center within a company, IT can identify the exact resources users are consuming over a given

period. A cost model can be assigned to that usage, which can be tracked by a wide range of criteria, including servers assigned to an application, virtual machine quantity, processor or memory used, and storage consumed. If this capability is a key requirement, it's important that chargeback modeling, which varies by automation platform, is evaluated thoroughly.

Security and Multi-Tenancy

Deploying stand-alone environments for individual departments is costly and adversely affects the organization's investment in its data center. The pragmatic alternative—a modern, multi-tenant data center—allows a shared infrastructure to support multiple end users with improved resource utilization, greater efficiency, and lower cost. To be successful, however, it must have a robust security design.

Security and multi-tenancy go hand-in-hand; controls must be integrated into the shared infrastructure to maintain separation of end users and their data. Evaluate the orchestration and automation tools to determine that they provide the management environment necessary to define the security controls. The tools should be tightly integrated with the APIs of the underlying compute, storage, and network resources. This allows groups of users to be defined, to be assigned or denied access privileges, and to be allocated a portion of the infrastructure with a guaranteed minimum level of service.

Most importantly, orchestration and automation tools should empower the administrator with monitoring and reporting capabilities to validate proper use of the shared infrastructure. Capacity planning, troubleshooting and usage reporting are greatly simplified when the orchestration and automation tools deliver accurate and insightful monitoring reports.

Networking

At one time, IP networking could have been considered the “plumbing” of the data center. There were “small pipes,” “big pipes,” “fast pipes,” and “slow pipes.” As technology has evolved, the sophistication and capability of IP networking has expanded significantly. Today, a metropolitan highway system may be a more accurate analogy—with traffic lights, express lanes, monitoring cameras, and turning lanes working in unison at every intersection.

The capability of modern IP networks to advance traffic selectively based on defined service levels is rarely used to its full potential. A well-designed private cloud will leverage these features to share the network infrastructure consistently, without bursts or bottlenecks, based on the service level assigned to each user, application, or traffic type.

Orchestration and automation tools are a central part of this process. These tools define the classes of user traffic and the priority each class of traffic should receive, then communicate those parameters to the IP network devices.

A well-implemented orchestration and automation tool will use these network features to improve service and performance while abstracting complexity from the users. For example, network service could be grouped into “Gold,” “Silver,” and “Bronze” categories for classification, with detailed traffic engineering configurations delivered to the network devices on the back side for implementation.

Hybrid Cloud Support

While most organizations have shown a preference for internal cloud infrastructures, instead of public cloud infrastructures, many companies are finding that combining the two provides the most flexible and scalable option.

Development groups within an organization can, for example, leverage the public cloud (such as Amazon EC2) to provision virtual machines for development, quality assurance, or load testing. When complete, these workloads can be migrated into the company's internal private cloud infrastructure for production deployment.

Public cloud providers supply a wide variety of offerings, requiring that an organization consider multiple factors:

- Which public cloud providers have service offerings that meet your requirements?
- Does the orchestration and automation software solution have integration with the set of public cloud providers the organization intends to use?
- How do you manage workloads across your public and private infrastructure?
- Can you capture and reconcile billing information across your public and private cloud infrastructure?

VEUC/VDI Integration

Virtual end-user computing (VEUC) is becoming a focal point for providing desktop services to an organization's users. Listing all the benefits of VEUC is beyond the scope of this document, but if the organization's service offering includes VEUC, then the orchestration and automation tool should integrate with it.

For example: a service catalogue on a web portal could allow a user to request access to a given virtual desktop, along with the specific applications the user needs.

The most common platforms today for desktop virtualization are VMware View and Citrix, including XenApp / XenDesktop. Identifying a software solution that can integrate with one or both, and that takes advantage of each product's features (such as linked clones and provisioning services), can provide significant value to an IT staff.

Multi-site Support

Data centers expand as business grows. Eventually, multiple sites are necessary to accommodate growth or to support requirements for high availability and disaster recovery. Many enterprises are looking at using public cloud services to accommodate seasonal peaks in demand or to support temporary workloads.

A good orchestration and automation tool will provide a consistent experience across multiple physical sites. To ensure high availability, some users will want to know where their applications are deployed. Others may not need the complexity required for site selection and identification. The tools should support all use cases.

Self-Service Options

Any consumer who has purchased gas or groceries will recognize self-service. From “pay-at-the-pump” to “self-checkout aisles,” options for self-service continue to proliferate.

Self-service empowers users to satisfy their needs quicker and more efficiently than waiting for a personal agent to perform tasks on their behalf. After users select a desired service from a menu of options, automation tools grant, deny, or route the request based on a policy defined for that user. Properly implemented self-service tools can provide greater efficiency, agility, and responsiveness than traditional, manual workflows.

In the data center, self-service may be provided directly to end users or it may be limited to IT administrators. In each scenario, workflow orchestration and automation tools complete the task of configuring the compute, network, storage, OS, and application resources without engaging subject matter experts from each of those departments. Ultimately, provisioning times often drop from months or weeks to days or hours, depending on organizational policy.

Orchestration and automation tools enable self-service. These tools transform IT deployment from the high-touch model of “managing ports” to the more efficient and scalable model of “managing policies.”

Roles, Governance, and Control

Manage policies, not ports. Grow resource pools, not complexity. These fundamental improvements in designing and operating data centers offer tremendous advantages. Once a policy for an application server has been defined, multiple instances of that application server can be created without additional manual work. Resources are consumed from shared pools of storage, network, and compute infrastructure as additional application servers come online. Resources are returned to those shared pools when the servers are decommissioned.

Orchestration and automation tools provide the management interface to define the policies at the heart of the data center. A good orchestration and automation tool will allow granular control of who is allowed to submit requests to the system, which people have authority to review and approve those requests, and when and how those requests will be implemented in hardware.

Reclamation

Many tools are available to script automated server deployment. A good orchestration and automation tool will track those resources through their lifecycle. For example, who is responsible for a server after it has been deployed? Is the application in use or has it been abandoned? Are investments being made to patch idle servers? When should a server be decommissioned and returned to the shared resource pools?

Many tools or scripts can stamp out servers; a great orchestration and automation tool will track server usages, reclaim the resources when they are no longer needed, and return them for reuse by other applications.

Customization and Programmatic Integration

A typical orchestration and automation suite provides a set of supported technologies and platforms that it can integrate with “out of the box.” Ideally, that feature set should cover the vast majority of the functionality an IT staff must implement to make the orchestration tool effective. In some cases, the out-of-the-box functionality must be extended to include integration with an additional application or system.

How difficult is this custom integration? Is it to be included as part of the initial setup via a professional services engagement? If it is post-implementation, does the IT staff have the skill set to provide the integration needed?

In addition, an IT organization may evaluate the ability of an orchestration suite to provide APIs where IT staffs can programmatically supply provisioning functionality, outside of a traditional graphical user interface. In this scenario, the orchestration and automation tool is largely transparent to end users.

Conclusion

There is a broad set of factors to consider when evaluating an orchestration and automation platform—a challenge to the IT staff that must support different technologies and platforms. The orchestration and automation tools must be flexible, extensible, easy to maintain, and enhance the economies of scale inherent in cloud architecture—public, private, or hybrid. Each of the key factors Ahead has discussed in this document must be evaluated in the context of the individual organization’s specific IT environment, priorities, resources, and long-term objectives.

Alex Mattson, Technical Consultant

Since graduating from the University of Illinois, Alex has travelled across the country designing and implementing storage, network, and virtualization solutions. Early in his six-year stint at EMC, he was introduced to VMware—and has been hooked ever since. Today he works in an architecture design capacity for Ahead's engineering team, building solutions around data center technologies from VMware, Cisco, EMC, and NetApp, among others. His interests include data center and cloud automation, desktop virtualization, and disaster recovery. Alex holds a VMware Certified Advanced Professional—Data Center Design and VCP certification, along with numerous certifications from Cisco and EMC.

Troy Whitney, Technical Architect

Troy joined Ahead with a zest for next-generation, end-to-end data center design. His attention is drawn to the integration of advanced technologies for virtualization, computing, storage, and networking. Prior to joining Ahead, Troy worked for six years at Cisco Systems—most recently as a data center consulting systems engineer focused on Nexus, MDS, and Cisco Unified Computing and for five years at NASA Johnson Space Center as an aircraft avionics engineer. Troy is a Cisco Certified Internetwork Expert (CCIE) and supports the Ahead office in Eden Prairie, MN.

About Ahead

Ahead is a leading provider of next-generation data center solutions, with specific expertise in virtualization and cloud computing architectures. Ahead designs and implements agile, service-oriented architectures to help clients transform their data centers from a technology-focused environment to a service-delivery platform that brings agility to the business and drives out cost. Solutions are built using a unique, simple, scalable, and repeatable methodology that speeds delivery and lowers risk.

Ahead, purpose built to drive private cloud enablement, employs a unique methodology called **THINK | LOOK | PLAN | MOVE**.

In the **THINK** phase Ahead works with clients to identify challenges and to understand and define current business objectives and strategies.

In the **LOOK** phase Ahead identifies all service elements and dependencies, performs gap analysis, and evaluates appropriate technologies.

In the **PLAN** phase Ahead develops architectures and TCOs, along with tactical and strategic implementation plans.

Finally, during the **MOVE** phase Ahead initiates its plan and executes on delivery of its offerings.

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