BRIDGING THE SKILLS GAP FROM DATA CENTER TO CLOUD

By Kevin Lees
Chief Technologist for IT Operations Transformation, VMware

vmware®

Table of Contents

Why Do We Need a Bridge?

"Software is eating the world." Marc Andreesen wrote these prophetic words in the *Wall Street Journal* in 2011, and today, it's safe to say that software is still eating the world. One way this has manifested itself is in how application needs drive cloud strategies and directions.

In a recent survey, 451 Research found that the future of IT is multi-cloud and hybrid, with 69% of respondents planning to have some type of multi-cloud environment by 2019.[1] While every company's digital transformation journey is unique, a common theme in recent months is making the cloud the predominant technology infrastructure. This reliance on cloud represents a "brave new world" for IT, one that makes it responsible for the success—or failure—of its company's transformation efforts. This raises a new set of challenges and opportunities that IT organizations must be aware of as they move ahead.

How the Skills Gap Emerged

IT has been implementing private clouds and supporting use of public clouds for several years now. But the pace of cloud adoption and usage has dramatically increased as companies across industries become digital businesses. As that pace quickens, IT must consider new ways to address concerns about data security and scalability, as well as find new ways to free up time and reduce costs.

This rapidly evolving landscape has exposed a serious vulnerability: a growing skills gap in IT. Companies are quickly realizing that their teams aren't competitive with their knowledge of evolving technologies. A recent survey posed the question: "Will your organization experience any IT skills shortages during the next 12 months?"—and 59% of IT decision-makers reported experiencing skills shortages.[2] The struggle to find the right IT skill sets has significant ramifications: 33% of IT decision-makers say that lack of the right cloud skill sets is the biggest challenge to implementing a cloud computing strategy.[3]

This skills gap and associated workforce shortage is partly due to an underestimation of cloud as the transformative approach to IT that it has become. As such, there has been a tendency to take the underestimated view that current skills are sufficient or just need to be adapted to this new technology. Second, there is also a natural tendency to resist change in IT. After all, a primary IT driver to minimize risk and change can actually increase risk in this scenario. IT has also historically adhered to inside-out thinking—knowing what an IT customer needs based on requirements-gathering—versus outside-in or actively collaborating with their customers to iteratively arrive at a solution they really need. Finally, the skills gap in IT is also due in part to common resource constraints — do more with less — which don't leave much room for new things like skills development or innovation that can come from that. But even if IT successfully addresses these challenges, individual contributors within IT can still be a barrier to overall success.

[1]http://www.information-age.com/multi-cloudhybrid-environment-dominate-enterprise-123469737/

[2]State of the CIO Report," IDG/CIO 2018

[3]State of the CIO, IDG, January 2018

Individual Contributors Also Play a Role

Like the IT organization, sometimes skilled individuals are resistant to change. While maintaining the status quo may work in the short term, in the long term, a different approach is needed. Cloud, and its underlying software-defined infrastructure, is not going away. Embracing a new cloud strategy is a career-enhancing opportunity and this is how it should be positioned. Individual contributors who are open to change and seek the opportunity to move forward are some of the individuals who will benefit most from the information in this white paper. Re-skilling or "upskilling" these resources to better adapt to these new cloud technologies will ultimately benefit the organization as a whole.

The Right Skills Propel Digital Transformation

The digital transformation has led to a significant shift in how IT delivers business applications. Historically, IT infrastructure and software applications were created to support and automate business processes to increase productivity and throughput. Today, business applications are emerging as the foundation for new business models. IT infrastructure needs to evolve to support this shift and be made available as software that incorporates a wide range of application types, locations, and platforms.

Organizations demand faster innovation—it is a business imperative. They expect a more flexible, customer-focused, service-oriented IT model that leverages modernized data centers in the form of a hybrid, multi-cloud environment. Highly dynamic, agile, available, and programmatic compute, network, storage, and security services are no longer a business advantage—they're a core operational requirement.

To meet these expectations, IT must be prepared to deliver the skills necessary to fully support the software-defined nature of the private cloud implemented in a modernized data center. To provide the level of agility the business expects, IT needs skills to optimize its use of automation coupled with policy-based control throughout the operating environment. Having the right skills ensures IT can operate efficiently and pursue business innovation.

Operating in a hybrid cloud environment means having the skills to move "up the stack" by becoming more application-centric. This applies not only to the way IT operates the environment, but also how it provides services to the application developer community. IT needs to be equally comfortable supporting traditional applications, as well as SaaS-based and next-generation applications.

Addressing the Skills Gap

Closing the skills gap is not an insurmountable challenge. This is not a case where IT has to completely start over; rather, it's about updating and supplementing existing skills, or applying them to new problems, or approaching them with a different mindset. This shift in perspective starts with being open to new opportunities and being recognized as a change agent within your organization.

TAKE CHARGE OF YOUR TRAINING

A good way to initiate change is through self-paced training. VMware Education Services can also be reinforced and supplemented in interactions with VMware Professional Services while they're on-site helping implement or apply VMware solutions to the company's cloud strategy.

SKILLS OR EXPERTISE NEEDED TO BUILD MODERN INFRASTRUCTURE

• Automation

• Software-defined networking

• Cloud-related security

• Optimization of operations for cloud

• Cloud-related applications

• Business-focused and marketing soft skills

Key Areas of Focus for Modern Infrastructure Skills

A modernized data center begins with modern infrastructure, which involves moving from siloed infrastructure layers, purpose-built hardware, and fragmented management to a fully software-defined, hyper-converged architecture. This transition requires skills in architecting, implementing, testing, and operating software-based, highly scalable, and dynamic environments. And in a software-defined data center, hardware becomes a commodity, allowing IT skill sets to de-emphasize specific hardware-related skills. Unlike static environments that are primarily focused just on reliability, a modernized data center requires expertise in building and operating environments with an eye toward continuous change and flexibility for the future, while mitigating reliability risks in a more automated fashion. Finding a way to extend IT's existing knowledge and skill sets into these new, modernized infrastructures is one of the most important things an organization can do to support and enable this transformation.

Automation

Maximum use of automation and orchestration is a critical success factor in driving agility and operational efficiency in the cloud. This requires programming skills, working with APIs, and familiarity with software development methods. Gone are the days of reliance on individuals writing unique, unmanaged scripts to provide automation. Today, automation, orchestration, and integration development should follow the same version control, testing, and release rigor as used for application development. This also means that modern continuous integration and continuous delivery (CI/CD)-based development strategy can be applied to developing automation and orchestration workflows, as well as ensuring the proper integration of the entire software-defined infrastructure. The secret here is to take the existing infrastructure knowledge and experience of the entire IT team and weave this into easily repeated policies that can be leveraged in an automated manner. What many IT teams find is that their overall expertise and value augments their organization since they can automatically ensure that key configurations or policies are always applied to workloads, no matter where their infrastructure components are deployed.

Networking

While more traditional networking skills are certainly applicable to software-defined networking, additional skills and comfort with policies and automation are now needed. A solid understanding of virtualization and the interplay between software-defined networking and other software-defined components of the stack is also required. In addition, when considering extending a private cloud to become a hybrid cloud, expertise is required in understanding how to apply software-defined networking as a common networking overlay in a hybrid cloud context. The primary risk of this approach typically comes from introducing brand-new platforms that do not serve as an extension of IT's existing infrastructure and require these teams to create brand-new policies and rules for components that they have never had to manage.

Security

Cloud-related security skills are critically important. These include distributed application security, data security and compliance, and applying security as an overlay in a hybrid cloud. Modern applications of security should include environment and application micro-segmentation, as well as integrating security into automated infrastructure and application provisioning.

Cloud Operations

Optimizing operations for cloud also requires additional expertise. Management and troubleshooting tools are becoming increasingly intelligent, requiring a higher level of data analysis and knowledge-based tuning skills. Expertise in setting up, tuning, and using application- and service-centric, integrated full-stack monitoring capabilities and doing so in a hybrid cloud environment must be considered. Expertise needed in other aspects of cloud operations include skills such as zero-downtime upgrading and patching, applying infrastructure as code and immutable infrastructure concepts, change and capacity management in a highly dynamic environment, and integrated, fully automated provisioning. These are very much the new, high-demand skills that forward-thinking organizations seek to enable on their IT teams.

Application

Application-related skills from a cloud perspective are now in high demand. These new skills include knowing how to map applications and workloads from existing servers to cloud, as well as application migration skills. Expertise in helping developers understand how to integrate security and operational considerations, such as resiliency, directly into their applications is needed, as well as working with modern configuration management tools like Puppet, Chef, and Ansible. Skills are needed in cloud-based applications (SaaS), as well as cloud platforms (PaaS), and infrastructures (IaaS). The IT teams that find the most success in this area have found the proper balance of time spent managing existing applications, while enabling delivery of new, next-generation applications across various cloud platforms, but with a single, consistent operational model.

Soft Skills

Finally, a new set of soft skills is required across the board in IT. These soft skills include the ability for IT employees to work with their counterparts in the business using a common language. It also means having skills in marketing and positively positioning what IT does and the services it offers to the business. The growth in these "business acumen" skills indicates one of the most significant transformations in value that IT has ever seen. Learning how to translate business needs and competitive requirements into properly aligned, automated, and capable IT solutions across an entire hybrid cloud architecture is IT's new mission. More IT personnel are involved in business planning and management meetings than ever before, and this new exposure has significantly shifted the view of IT as a "cost of doing business" into an organization's most highly valued investment for the future.

NEW, CLOUD-FOCUSED IT ROLES

• Cloud architect

• Cloud engineer
  with specialization

• Cloud administrator

• Cloud service owner

• Cloud analyst

• Cloud automation and
  integration developer

• Site reliability engineer

Bridging the Gap

Cloud capabilities have a direct impact on existing IT roles, but also provide opportunities for new, cloud-focused roles.

Cloud Architect

The importance of cloud to a business' digital transformation coupled with new approaches and considerations associated with both software-defined, hyper-converged architecture and hybrid cloud, calls for a new architecture domain, namely that of a cloud architect. The cloud architect needs to translate the business' and IT's cloud strategy into a solution roadmap and adaptable design. This means having functional expertise in all aspects of the software-defined data center and hybrid cloud, including capabilities provided by specific public clouds. The cloud architect also has to understand resulting application and operational impacts of these software-defined and cloud environments, as well as the opportunities they present. Understanding automation and integration implications, as well as modern tools, is critical. This role must also understand what it means to connect applications across clouds and devices with security, compliance, and availability using a consistent but flexible architecture.

Cloud Engineer with Specialization

This role has a direct impact on the expertise provided by all of the other engineers in these environments. To directly support the cloud architect, engineers must acquire a broad full-stack understanding, while providing a deep understanding of one or more specializations, such as software-defined networking and security. They have to understand configuration implications, automated environment provisioning capabilities, and testing and validation methods. Engineers must develop increased subject matter expert (SME)-level skills in SaaS, PaaS, and IaaS, as well as application migration approaches and capabilities. They must also understand modern cloud-native application architectures and how to work with developers to optimize their applications for cloud. Finally, they must use modern infrastructure management concepts like infrastructure as code and immutable infrastructure to ensure that business and IT needs are always met.

Cloud Administrator

Ideally, administrators can become generalists if SME-level skills are provided by engineer roles. But administrators still have to acquire a working knowledge of software-defined data center components and public cloud administrative interfaces so as to implement engineer-designed configurations. They also must develop expertise in software-defined infrastructure and cloud-related upgrading, patching, and other modern infrastructure management concepts, such as infrastructure as code and immutable infrastructure. In addition, they must have skills in understanding business objectives, leveraging modern, intelligent operations and troubleshooting tools, as well as identifying automation opportunities and executing cloud-based migrations.

Cloud Service Owner

In addition to supplementing and evolving skills for existing IT roles, a cloud focus provides opportunities for the consideration of some new roles in IT. Given the need for an agile, service-oriented IT model for data centers that leverages both private

and public clouds, one new role is that of the cloud service owner, which requires expertise similar to that of a product manager in a product-oriented company. Some companies choose to use the title "cloud product manager." Regardless of the title, this role is responsible for the full lifecycle of one or more cloud services from collaboration with the business and others when defining the service, through development and delivery and then operations and improvement. It requires soft skills for successful interaction with the business, as well as for marketing relevant services.

Cloud Analyst

With the emergence of intelligent operational tools that will increasingly use deep learning through artificial intelligence (AI), another new role for consideration is that of a cloud analyst. This role can be thought of as a combination of data scientist and tools expert. The role requires expertise in intelligent data collection and ingestion, data manipulation and analysis, along with an intimate knowledge of how to expertly tune the analysis and visualization tools to make optimal use of the data in each operational use case.

Cloud Automation and Integration Developer

Automation, orchestration, and integration are keys to success in achieving the agility and operational efficiencies provided by cloud. To really achieve this success, IT should consider adding a cloud automation and integration developer role. This role requires expertise in:

• modern software development methodologies and languages
• configuration management tools such as Puppet, Chef, and Ansible
• automated testing
• modern deploy and delivery approaches

Site Reliability Engineer

Finally, a newer role made popular by Google is the site reliability engineer (SRE). SRE is defined as "Fundamentally, what happens when you ask a software engineer to design an operations function." The SRE requires similar expertise to the cloud automation and integration developer, as well as the cloud administrator. The SRE can be seen as a replacement for both roles, depending on the use cases, and requires expertise in modern software development methodologies, configuration management tools, and deploy and delivery approaches. Like the cloud administrator, the SRE needs expertise in leveraging infrastructure as code, as well as applying immutable infrastructure concepts.

Next Steps in Filling the Talent Pipeline

We've described why cloud requires new or modified skills, as well as what is involved with these roles. The next question is how to fill the talent pipeline for these skills.

Education provides a solid basis for the required skills, but to truly become proficient requires experience. Gaining hands-on experience requires time. To accelerate experiential gain, as well as a company's cloud journey, external resources such as VMware Professional Services can be engaged to provide instant expertise to help IT experience immediate and incremental value in its cloud journey. VMware Professional Services can work side by side with IT's resources that have gone through educational classes and can provide very effective experiential knowledge transfer.

To expand their talent pool, many companies are establishing internships and apprenticeships. Internships are more common in the United States and represent an opportunity for an existing student to gain work experience in addition to their separate education program. This translates to college/university students, or less commonly high school students, or entry-level workers, seeking temporary work opportunities that last only a few months. Apprenticeships are more commonly found outside of the United States and apply to people at any point in their career. They are typically structured as on-the-job training from an experienced mentor for a year or more. By the end of the program, apprentices will be fully proficient at the job. In a job market where it's challenging to find individuals with the high-demand skills described in this paper, establishing internship or apprenticeship programs is worth consideration.

How Does VMware Address This Demand for New IT Skill Sets?

A truly modern infrastructure must be able to keep pace with change, while making the most of existing technology investments. VMware has invested heavily in capabilities and technologies that enable IT organizations to evolve over time, and natively extend compute virtualization to storage and the network for a unified platform that supports both traditional enterprise applications and cloud-native applications. IT can continue to leverage existing skill sets and use familiar tools—minimizing disruption and the need for additional training. Since organizations require IT to enable a modern infrastructure that is future-ready and able to support new applications, technologies, and public cloud, the key is to optimize existing investments while building a next-generation, cloud-capable IT-business plan.

With VMware solutions, IT can build a digital foundation that is hardware agnostic and can run any application on any cloud, using a unified operational model. This approach enables IT to scale up or down and move workloads on or off premises as needs change, while maintaining security, control, and full IT integrity. This unique approach allows IT to leverage much of its existing knowledge, while also enabling it to support the next generation of innovation that its organizations demand. By not forcing IT to learn an entirely new approach to its operating models, it can then selectively introduce new skills, technologies, and capabilities into its environments without having to start over. This is the key to enabling innovation so critical to business success for the future.

Selectively upskilling your existing talent pool with the right skill sets is certainly a preferred way to acquire skills needed for the future. Another way that VMware can assist in this transformation for IT, beyond strategies, technologies, and architectures, is through our education services. VMware Education Services delivers training using various delivery methods, and outlines a set of role-based learning paths through which teams can learn the skills they need for specific technologies and solutions. Corresponding, role-based certifications are available to validate skills attainment. Education Services can help organizations better understand their training needs with the Knowledge Skills Assessment (KSA). This self-assessment survey tool identifies knowledge gaps based on skill level, job role, and VMware product, making it possible for customers to invest in targeted training based on their unique requirements.

Conclusion

"Software really is eating the world." With the rise of digital business, IT needs to deliver flexible infrastructure and application services with agility and control. Digital transformation is fueled by applications that can run in varied cloud environments—whether private, public, or hybrid. The new definition of private cloud represents a modernized data center built on a software-defined, hyper-converged architecture. To completely leverage the capabilities provided by cloud and realize the agility and operational efficiencies it offers, an expanded set of skills is required. Fortunately, existing IT skills can serve as an effective jumping-off point for acquiring these new skills, so IT should work with its business counterparts to start from a position of relative familiarity versus having to start from scratch. Formal education classes serve as a good foundation, but to fully take advantage of the skills requires experience and proper coordination across the entire organization. VMware is excited to be its customers' next-generation strategic partner, and can help the business and IT address these needs through a combination of the right technologies for the future, VMware Education Services, VMware Professional Services, and our new emphasis on strategically guiding our customers though their entire digital transformation, helping every step of the way.

Today's digital transformation is driving rapid and fundamental changes in businesses and their operating models. To support this, IT must similarly transform its data centers. VMware enables IT organizations to modernize data centers and deliver IT infrastructure and application services with the speed and agility to support business innovation and growth while optimizing total cost of ownership. VMware's software-defined HCI architecture of natively integrated compute, network, and storage virtualization technologies, together with automation and management, enables businesses to modernize their infrastructure, automate IT, and run modern applications. This innovative, software-defined approach delivers cloud service provider agility and economics in the data center and extends to an elastic hybrid cloud environment.

PREPARE FOR THE FUTURE WITH VMWARE

Start the journey to a modernized data center >

Join Us Online:

About the Author
Kevin Lees is the field Chief Technologist for IT Operations Transformation at VMware. His focus is on how customers optimize the way they operate VMware-supported environments and solutions. Kevin serves as an advisor to global customer senior executives for their IT operations transformation initiatives. He also leads the IT Transformation activities in VMware's Global Field Office of the CTO.

vmware®

vmware®