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Virtual Labs: The Key to Effective Technical Training

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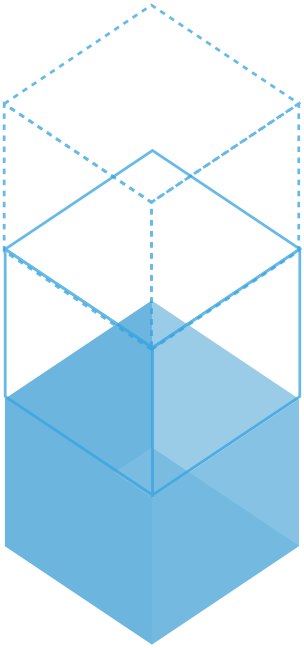
Executive Summary

Virtual technical training has never been more critical than during today's remote working environment. Although virtual training isn't new, the pandemic vastly expanded the need to retool nearly all in-person, classroom training into a virtual format. From internal training organizations at large enterprises to companies that develop or sell software, the ability to reliably offer high-performance, global remote training complete with complex lab environments is critical to maintaining business and sales continuity.

Offering effective virtual hands-on labs is one of the biggest challenges training organizations face, whether for self-service on-demand learning or instructor-led training. Moving from in-person to virtual labs requires an understanding of how they fit into an overall training program and what technical capabilities are needed for success. This paper will look at key aspects of implementing virtual labs, including the ease and speed of setting up and tearing down lab environments, scalability to support varying classroom sizes and manage costs, integration with existing Learning Management Systems (LMSs), and performance for organizations with a global footprint. Choosing the right virtual hands-on lab solution can accelerate the move from in-person to virtual training now and establish a foundation that can support more effective in-person training in the future – even at extremely large scale.



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The Evolution of Technical Training

Even before the pandemic instantly ushered in the new work-from-home normal, technical training has been changing, both in terms of delivery methods and how it is structured and offered. Gone are the days when nearly all training was done in person, where instructors and students had to travel, and IT had to ship and set up all the equipment required for hands-on demos. Once onsite, it wasn't uncommon for lab equipment to have functional or configuration issues. While in-person training still held an important role, several key aspects of training have evolved over the past few years:

Modular, Self-paced Training

Content has become more modular, with focused topics and in formats such as videos and webinars that can be consumed in 30- to 90-minute segments. The modular nature of content enabled more self-guided, self-paced training that offered much greater flexibility with a lower delivery cost. However, students often still needed to go to a physical location to gain access to labs.

Virtual Instructors

For topics that require instructors, there has been an increasing shift from in-person, instructor-led training to Virtual Instructor-Led Training, or VILT. The success of VILT hinges on the ability to deliver exercises through a cloud-based infrastructure and having easy-to-use environments that are performant for users regardless of geographic location.

Cloud Delivery

Cloud capabilities have changed the face of virtual training by solving a number of issues surrounding the delivery of virtual labs. The cloud provides more scalable capacity, eliminating hardware cost and configuration burdens, while allowing students and instructors to access labs from anywhere.

Many organizations have been using a blend of learning methods: self-guided, on-demand, which is ideal for content that doesn't require an instructor; and instructor-led training (ILT), either in-person or as VILT.

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Challenges on the Road to Going Virtual

Even as content has become more modular and virtual delivery methods have improved, training organizations recognize that the biggest challenge to going virtual is making lab resources available for the different types of learning. The most common hurdles are:

Constrained Lab Resources

On-premises labs have a limited amount of hardware, which requires capacity planning and scheduling. Each machine requires individual configuration, restricting the number of available lab machines to what IT staff can provide. As a result, classroom sizes are constrained by the availability and capacity of equipment. Instructors lack self-service capabilities and must rely on highly skilled IT staff to provision equipment.

Student Experience

Lab equipment may arrive at training sites with technical issues that result in poor student experiences. Companies that elect to host a private cloud from a single location in an effort to move beyond the use of physical equipment experience high latency and insufficient bandwidth for locations outside the hosting region. This lack of performance limits the ability of students and instructors to interact effectively, and can impede effective self-paced training.

Cost of Delivery

The costs associated with owning and maintaining equipment for the desired amount of training can be significant, as organizations must maintain sufficient capacity for the largest planned class size. Skilled technical staff is required to configure complex lab systems, which need to be acquired, maintained, and shipped; and travel for instructors and students is expensive. At the same time, the lack of adequate lab resources can render training ineffective, which is costly to the business.

Global Reach

Many training organizations are global and must support students from around the world. Flying equipment, instructors, and students is inefficient and expensive, and lab instruction is often abandoned as being too hard or too expensive.

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Even organizations that attempt to design and deliver virtual training labs hosted from their own data centers or private clouds, or using public cloud solutions not purpose-built for virtual labs encounter similar issues to those related to using physical equipment. Training environments may be limited by available resources and require complex provisioning for each student and class. Students may be unable to join labs when they are required to install VPNs that are blocked on their local computers. Data centers and single-location private clouds are unable to deliver the levels of performance necessary to provide usable lab resources for a global student population. Costs can balloon as cloud providers charge by blocks of time or resources, regardless of usage.

For example, the training team at Infoblox, a leading provider of secure cloud-managed network services, had been using a single data center based in San Jose, California, to deliver remote lab environments. Students outside the Americas constantly complained about slow lab access, and VPN issues were persistent. And while the team was able to provide scheduled VILT, they were unable to provide on-demand delivery since every environment had to be configured manually.

In another case, Qlik, a provider of data integration and analytics solutions, needed to scale its instructor-led and self-guided on-demand curriculum to accommodate more students and geographies. The initial cloud solution chosen by the curriculum team posed multiple technical and cost hurdles. The provider charged by the day, so the team had to schedule training to maximize daily usage in order to keep costs down. Virtual machine environments were locked down and resulted in provisioning bottlenecks that wasted instructor time, delayed classes, and caused poor user experiences. It took a week or more to make changes to lab templates, making it impossible to scale.

Both companies realized they needed to move to a global cloud-based infrastructure paired with a well-designed virtual training lab solution to ensure their students received the quality of training they needed.

As organizations look for ways to tap into cloud-based virtual training labs, there are specific areas that warrant close examination.

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Considerations for Implementing Virtual Labs

While LMS options are abundant, there are fewer choices for quality virtual lab solutions. When it comes to deciding what type of solution can best facilitate a transition from physical or on-premises lab environments to virtual labs, there are several factors to consider:

Speed and ease of provisioning lab environments

A primary objective in moving to virtual labs is to open up the bottleneck that occurs when IT teams are burdened with the responsibility of having to maintain and provision physical equipment. The use of virtual machines (VMs) and cloud resources has become a game-changer by allowing physical environments to be virtualized. Configuring and provisioning these virtual environments, however, can still be complex enough that training teams must spend significant time standing them up and tearing them down for each student. Virtual labs should be simple to set up and configure, even for very complex environments, and should be available within minutes.

Ease of use

To support the widest range of skillsets across training managers, instructors, and students, the virtual lab solution should be easy to learn and use. Intuitive, self-service options should be available to reduce the burden on IT, improve the productivity of trainers and instructors, and to allow students to self-provision the labs they need for self-guided, on-demand courses.

Scalability to support varying classroom sizes

The beauty of the cloud is its ability to support flexible capacity demands, pay-as-you go pricing models, and access from anywhere. A virtual lab solution should take advantage of these capabilities, and support surges or decreases in demand without long lead-time planning or fees for unused resources. Training organizations should consider their future needs as well, such as extending virtual training to large events or conferences, whether they are completely virtual or in-person. In the past, providing hands-on labs for large events has generally been cost-prohibitive, but virtual labs supported by robust cloud infrastructure can open the door to enhanced training experiences for a much greater number of students.

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Skytap can help companies as they shift from in-person or private cloud labs to global high-performance virtual labs that are flexible, easy to use, and scalable.

LMS integration

Many training organizations already use Learning Management Systems to administer overall online learning, including scheduling, registration, analytics, content delivery, and other tasks. Many LMSs provide a Learning Tools Interoperability (LTI) interface that allows external, third-party tools to integrate securely into existing LMSs. Virtual labs that support LTI give companies the ability to retain their LMS investment and capabilities, while adding beneficial hands-on labs to their existing training platform. For organizations using an LMS that is not LTI-compliant, the virtual lab solution should offer alternative options for custom integration.

Performance

Some organizations elect to establish private clouds from a single location as they move from in-person to virtual hands-on training, only to find that students and instructors outside their immediate region are plagued by poor performance due to high latency. To ensure the responsiveness of lab environments, the virtual lab solution should offer multiple global Points of Presence (PoPs) that can effectively support all learning participants, wherever their location. High performance facilitates instructor productivity and provides students with a more beneficial learning experience.

Check out Skytap for your virtual training needs

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Tigera Grows Virtual Training During Pandemic

Challenges

Tigera, provider of networking and network security software for the Kubernetes container-orchestration system used by thousands of software development teams, had to pivot from hosting 60-70 in-person training events per year to a completely virtual training model due to the pandemic. Its business relies on using training to convert open-source customers into purchasers, and the move to an online-only marketplace created intense competition for mindshare.

The company realized that offering free virtual hands-on training would entice customers to attend its online events over competitors. However, provisioning environments internally or requiring customers to pre-provision would require significant time, development effort, and result in inconsistent environments. Further, some customers were likely to break their environments, effectively ending their training session due to the time required to provision a new environment.

Solution and Outcomes

To deliver its virtual training, Tigera first provisioned and validated a master lab environment within Skytap, and then used Skytap to add registrants and ensure all student environments were provisioned at the time of the event. Some users broke their environments during the instructor-led courses, but were quickly re-provisioned with a single click.

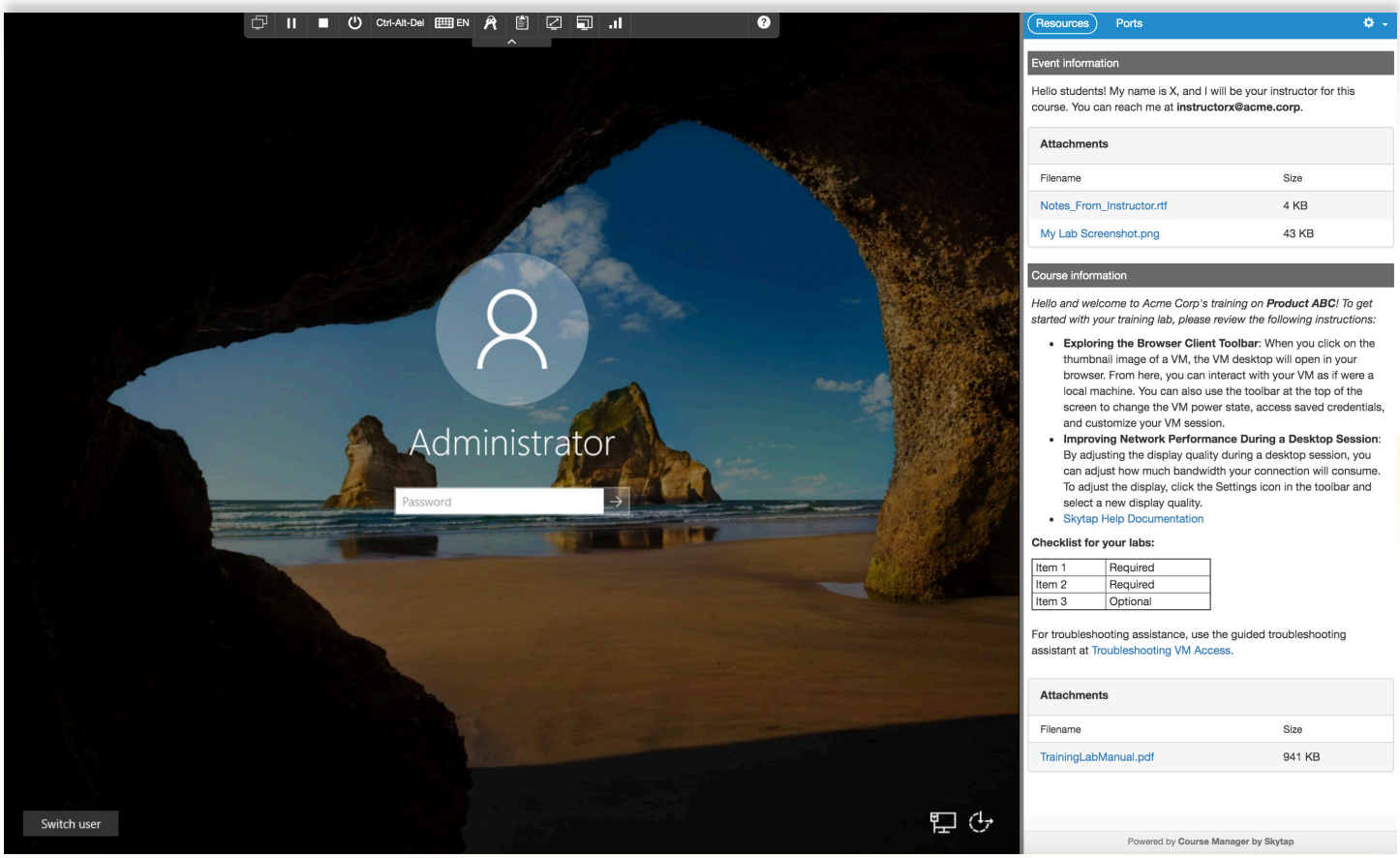
> "We would not have been able to pivot quickly to virtual product training without using Skytap. We've been able to keep prospective customers engaged, add last-minute attendees, and quickly provision environments."
>
> - VP Marketing, Tigera

The company's online events have become very successful, hosting up to 150 attendees at a time. With Skytap, the training team can accommodate last-minute registrations, which have become valuable sales leads. As shelter-in-place restrictions ease, Tigera expects in-person attendance may be slow to resume, but plans to continue using Skytap to support a blended mix of in-person and virtual instructor-led training.

Skytap Virtual IT Labs

Skytap supports lab delivery for self-service on-demand learning, as well as for in-person and virtual instructor-led training, with a global footprint. It's an add-on subscription to the Skytap cloud service that virtualizes even the most complex technical training environments, from software to middleware, OS, network connections, and more.

With Skytap, training teams can provision labs, distribute access details, and share training assets such as lab manuals in minutes. Instructors can create virtual classrooms for multiple students in less than a minute with just a few clicks. Students are able to access their training labs and assets from anywhere with a web browser and internet connection. Operations staff and instructors have full visibility and control, with comprehensive administrative tools and over-the-shoulder access. Support for the LTI standard provides easy integration with existing LMSs.



Skytap Student View

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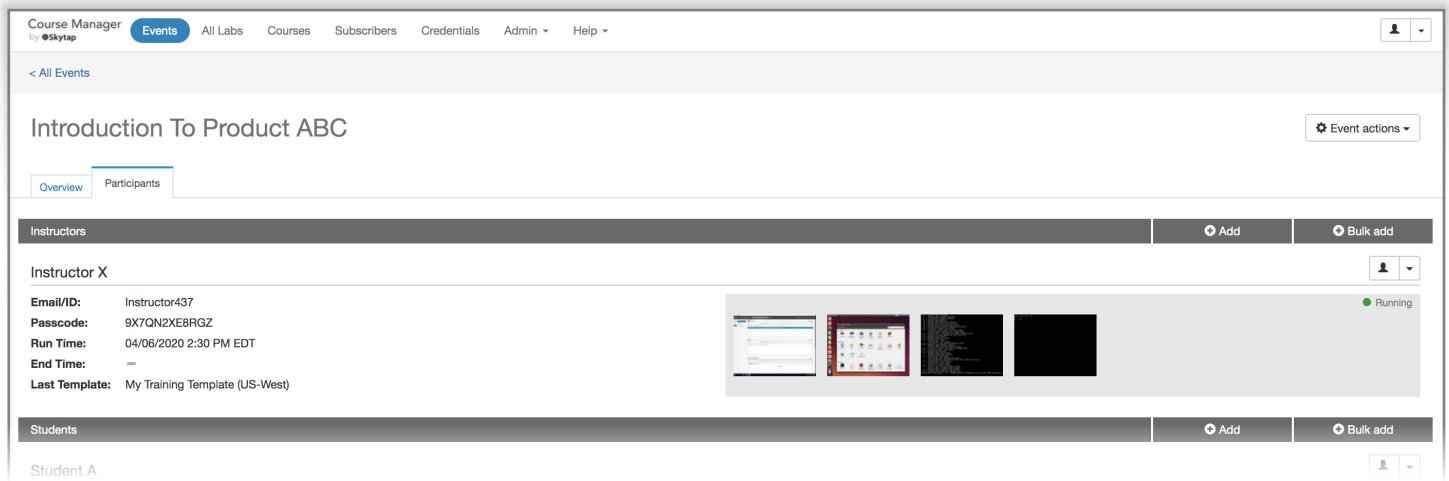

Skytap Instructor View

Skytap Benefits

Skytap's strength comes from robust underlying cloud infrastructure combined with a straightforward dashboard that simplifies provisioning and management of virtual labs, and reduces or eliminates the burden on IT.

Simple Image Creation

Skytap makes it easy to build even the most complex lab images, with as many VMs and as much storage, RAM, computing power, and networking as needed. Lab images are saved as templates that are used to provision lab environments within Skytap.

Cloud Delivery

Cloud capabilities have changed the face of virtual training by solving a number of issues surrounding the delivery of virtual labs. The cloud provides more scalable capacity, eliminating hardware cost and configuration burdens, while allowing students and instructors to access labs from anywhere.

Fast, Easy Environment Provisioning

Using Skytap templates, lab environments can be provisioned from the user-friendly dashboard in minutes, with no scripting or manual configuration required. Existing lab images can be imported to accelerate migration. Training managers or instructors can then create as many exact replicas as they need with a single click. Once students complete their labs, environments are automatically discarded, releasing resources and optimizing cloud consumption. Skytap's simplicity allows training teams to deploy classes in minutes rather than hours or days, and frees them up to focus on curriculum rather than lab configuration tasks.

Skytap is unique in its capability to support both x86 workloads and AIX, IBM i, and Linux on IBM Power Systems on either IBM Cloud or Microsoft Azure for companies with traditional data center-based applications that want to provide virtual training lab capabilities for those applications.

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LMS Integration

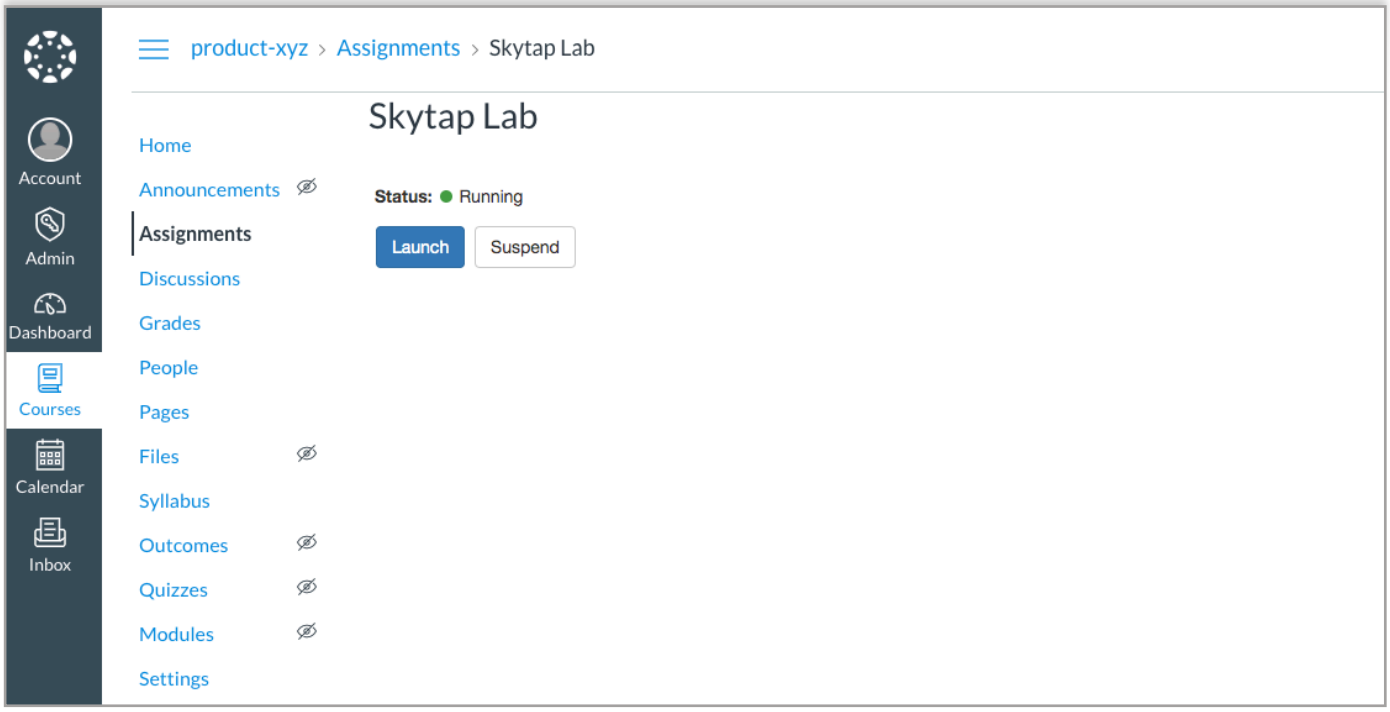
Support for the LTI standard assures straightforward integration with existing LMSs and automated workflows, allowing companies to add comprehensive virtual training labs to their existing systems for an end-to-end self-service training solution. The Skytap dashboard can be customized to complement existing systems for a seamless experience for training teams, instructors, and students. Skytap also offers custom integration options for LMSs that do not support LTI.

Cost Effective

Companies achieve significant cost savings by reducing or eliminating the expenses of owning and maintaining infrastructure, configuring and shipping lab equipment, and the staff associated with these tasks. Skytap's pay-as-you-go model means that organizations only pay for capacity used, when it is actually being used.

Global Footprint for High Performance

Skytap has multiple PoPs around the globe to ensure that all virtual lab environments perform flawlessly regardless of where instructors or students are located. Copies of lab environments are hosted on the PoP nearest the student's location, reducing latency and providing students and instructors with positive, productive experiences.



Skytap LMS integration

To see Skytap in action, watch the Instructor Led Training video.

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Skytap Supports IBM Fast Start

Challenges

IBM hosts their annual Fast Start global cloud summit for more than 8,000 attendees in three locations, with curriculum supported by hands-on virtual labs for individual students. Virtual labs had three key requirements:

- Every environment must launch within 15 minutes of established time window
- Connections must be issued to each environment concurrently
- Each environment must be deleted after coursework and testing is completed

IBM also needed to ensure that the number of lab environments could be adjusted up or down as workload requirements changed, often at the last minute.

Solution and Outcomes

Using Skytap's virtual lab capabilities, IBM was able to meet all of its requirements and easily support every student needing a lab. Scheduling was planned based around the number of environments needed, amount of RAM and storage required, lab runtime, room size, and considerations for things such as classes running late or the n eed for jump hosts. Using Skytap, IBM was able to quintuple the speed at which environments were deployed and run, allowing IBM's Event Tool to action many more (or fewer) requests at a given time than originally estimated.

The event has grown over the years, both in number of attendees and amount of required compute resources. The two key factors considered are the raw number of virtual resources and the speed of turnaround (starting/stopping/creating/deleting complete virtual data centers.). The peak metrics for virtual lab environments used at IBM's 2020 Las Vegas Fast Start event illustrate Skytap's impressive capabilities:

Peak Number of Concurrent Resources

RAM	66,860 GB
Storage	1,836.4 TB
Virtual Machines	3,516

Resource Totals

Total Environments Provisioned	3,735
Templates (discrete training courses)	103

Moving forward, IBM will look to incorporate AIX, IBM i, and Linux on IBM Power workloads in addition to continuing to its extensive use of x86 workloads.

Real-World Successes

In the Qlik example cited earlier, once the curriculum team moved their virtual labs to Skytap, they experienced a 97% decrease in the time it took to deploy classes for students. Their instructors had more time to focus on curriculum and content, and students had better learning experiences, which drove increases in sales and revenue. A dramatic 65% infrastructure cost reduction freed up budget that could then be used for new curriculum development. The virtual labs' versatility and ease of use encouraged broad adoption among both technical and lay users throughout the organization.

By using Skytap, Qlik decreased class deployment and configuration times by **97%**

In the case of Infoblox, its training team made the decision to migrate from a single data center to Skytap to better serve their global students. They are now able to offer paid on-demand courses that have increased on-demand training revenue by 40%. Customer complaints about latency and VPN issues have vanished, and there has been a dramatic increase in the speed and agility of their virtual labs.

Infoblox increased revenue from on-demand training by **40%**

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About Skytap

Skytap is a cloud service purpose-built to natively run traditional systems in the cloud. Our customers use Skytap for running production, disaster recovery, virtual training labs, and development workloads. We are the only cloud service to support AIX, IBM i, and Linux on IBM Power together with x86 workloads, enabling businesses to accelerate their journey to the cloud and increase innovation. To learn more about Skytap or schedule a demo, visit www.skytap.com

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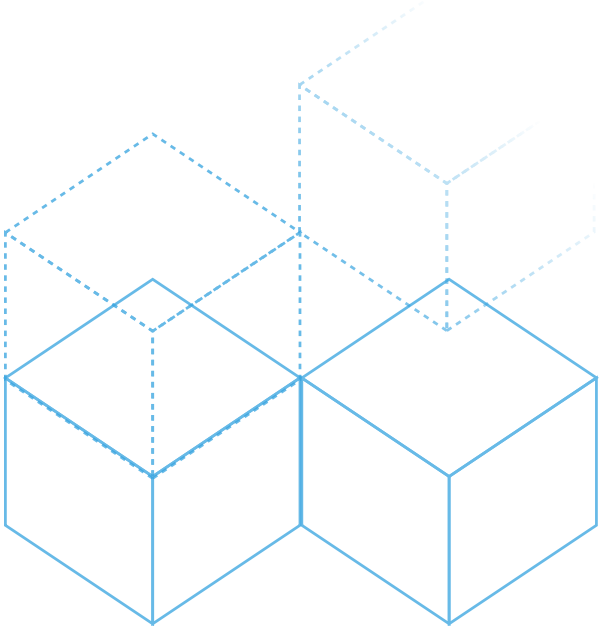
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