Reinventing Virtual Learning: Delivering Hands-On Training using Cloud Computing
Contents

1. Today’s Training Delivery Challenges ................................................................. 3
2. Virtual Classrooms: Reinventing the Traditional Learning Environment ................ 3
3. The Missing Component: Hands-On Learning ..................................................... 4
4. The Solution: Skytap ......................................................................................... 5
   4.1 Classroom Set-Up ....................................................................................... 6
   4.2 Class Delivery ......................................................................................... 7
   4.3 Classroom Reuse ................................................................................... 9
5. Skytap Benefits ............................................................................................... 9
6. Conclusions .................................................................................................. 10
   About Skytap ............................................................................................ 11
Reinventing Virtual Learning: Delivering Hands-On Training using Cloud Computing

1. Today’s Training Delivery Challenges

The challenges facing training organizations continue to grow. Companies need to provide software and technical training for employees, but are under increased budget pressure to reduce per-seat training costs and eliminate travel expenses. Furthermore, training attendees are under pressure to continue their regular work functions and often do not have the luxury to block out entire days on their schedule to attend training. To address these pressures, we’ve seen many training organizations look to online and distance learning to solve cost and location challenges.

However, implementing effective distance learning and reducing costs is not simple. Emulating a complex software application typically requires a training environment with multiple machines preconfigured with numerous components. In addition, making a classroom environment available over the Web requires specialized virtualization software and complex IT infrastructure. Finally, administration and maintenance of remote classroom equipment requires full-time, skilled technical staff that is too costly for most organizations.

The question then becomes can training organizations with limited resources take a traditional classroom environment online and achieve the same learning outcomes? And simultaneously, can they reduce equipment and administration costs for both traditional and virtual training? This is the challenge this whitepaper will explore.

2. Virtual Classrooms: Reinventing the Traditional Learning Environment

The proven approach to effective technical training has traditionally been Instructor Led Training (ILT). In this model, an instructor lectures, presents slides and demos on a projector, draws on the whiteboard to help explain concepts, and instructs students to practice using the concepts presented by completing hands-on labs using the computers in the classroom. The students, all in the same physical classroom with the instructor, each have a computer in front of them for lab purposes where the software has been pre-installed. When students need lab assistance the instructor is there to clarify instructions and offer technical assistance.

Taking all the various components of this rich
technical learning environment online has been an elusive but continuously pursued goal. Web conferencing and online collaboration tools (such as WebEx or Microsoft Live Meeting) offer the voice conferencing and presentation tools necessary to deliver the slide/lecture, discussion and white boarding components remotely. With essentially all learners now having access to network bandwidth speeds of DSL or better, the user experience of using these tools has improved. Live video of the instructor can usually be included as well, improving student engagement, and Voice Over IP (VOIP) technology can also be used for the phone conferencing component, further reducing costs.


Noticeably absent from the online version of our ideal technical training experience is the hands-on lab component. After going over concepts (through slide/lecture/demo/discussion) the effective online course should make the learning practical by enabling students to “learn by doing.” No lesser an authority than Confucius once said, “I hear and I forget, I see and I remember, I do and I understand.” Technical training without the hands-on lab component too easily becomes a passive experience similar to watching television. The student is left in observation mode. No matter how good the presenter or the demo, the learner never gets hands-on practice with the software and as a result knowledge retention rates suffer and skills are not learned. Relegated to the role of viewer, the students tune out or ‘change the channel’ by accepting easily available distractions (such as email, web browsing, work colleagues, etc.) which the instructor will likely not even be aware of.

Introducing a hands-on lab component changes this equation and helps the instructor engage the students and allow them to practice using the software being taught. To add this needed component to our virtual training, we need an enabling tool which students can use to apply the concepts learned and synthesize conceptual information into practical skills.

Many training organizations have not discovered or implemented such a tool, instead simply leaving the lab component out of their online course offering all together. Alternatively, some organizations try to distribute their software directly to the students to install on their local machines. Unfortunately these approaches are not effective for achieving the desired learning outcomes.
4. **The Solution: Skytap**

Skytap provides a powerful and flexible classroom environment accessible to instructors and students over the Internet. Just in the same way that a WebEx solution is available online for presentation and audio conferencing, Skytap is available online for hands-on labs and exercises.

Skytap is based on a new technology called ‘cloud computing’ which makes computing resources available on demand. As a result, Skytap training customers have access to a large, shared pool of virtual machines which can be accessed whenever they are required. Computing resources are charged for by the hour, which means a training organization can align classroom lab costs to student demand and no longer have to pay for underutilized classroom equipment.

Skytap’s has a powerful, self-service classroom management application which enables instructors and lab administrators to set up and tear down lab environments in minutes instead of manually configuring labs. Furthermore, IT administration is dramatically reduced because Skytap is a fully managed, hosted service. Let’s explore how Skytap is used during a typical training class.
4.1 Classroom Set-Up

An instructor can create a classroom to suit his or her specific course needs and power the machines on in a matter of minutes. By simply logging into Skytap’s Web interface, a classroom environment can be created using server and client machine ‘templates’. These templates can simply be images captured from traditional training machines and uploaded to Skytap, or they can be created from scratch using any of the numerous operating systems in Skytap’s public library including Windows clients (e.g. Windows XP), Windows Server and Linux variants.

Each classroom (or ‘configuration’) resides on its own private network. Instructors have a high degree of control over the network settings in the classroom, including the ability to change the hostname of a virtual machine, use static IP addresses within a virtual subnet, map network drives within the subnet, run their own DNS or WINS servers within the subnet and more. Internet access from the virtual machines can be turned on or off.

During class there is often a need to provide students with lab files. In preparation for this, an instructor will typically download materials to a share folder on a single server machine in the virtual classroom to which the student machines are mapped. In this way the instructor can easily share the software installers and lab files required for a particular course with all students.

To prepare for a course in which the labs build upon each other, instructors can create a snapshot of the virtual machines at the end of each lab. During a class, this enables the instructor to help a student who had trouble on a previous lab.

![Fig. 2 Creating a Classroom Lab from a Pre-Built ‘Template’](image-url)
lab to continue on to the next lab by providing a snapshot of a virtual machine with prior exercises completed.

Before a class, instructors will invariably want to control what students can access and when they can access it. Skytap provides full access control settings. A best practice is for the instructor to configure Skytap settings specifying the hours when a machine is available to students and whether or not the student can power on the machine. Because machines can be accessed from anywhere, the instructor may decide to allow students to access machines even during non-classroom hours.

4.2 Class Delivery

During class delivery, each student accesses his or her dedicated virtual machine desktop via Skytap Remote Access, a standard web browser running a Java applet, or via a Remote Desktop Protocol (RDP) client. A student is sent a unique Web URL with the class registration email to access their machine. With a “full screen” view of the Desktop, the student may soon forget that the labs are not running on their local machine. In addition, the instructor will have access to some very helpful features including:

» **Thumbnail View** - the instructor can see thumbnail views of each student machine desktop from a single web page. This allows the instructor to easily monitor student progress during labs.

![Fig. 3 Instructor ‘Over-the-Shoulder’ View for Monitoring Progress and Assisting Students](image-url)
Instructors find this feature very useful since it gives them some insight into what students are doing during assigned labs.

» **Over the Shoulder** – Instructors can monitor student progress and if a student requests assistance during a lab, the instructor can easily access the student’s desktop and assist. Both the student and the instructor will see the same view of the desktop simultaneously. Unlike with web conferencing tools, there is no need to “share the desktop” or grant presenter privileges back and forth. This feature in combination with an audio conferencing tool provides a lab troubleshooting capability as good as if the student and the instructor were in the same room together.

» **Add Hardware Resources** – if a virtual machine requires additional memory or processing power for a particular lab, the instructor can easily increase the amount of RAM or CPU dedicated to the machine, even during class.

One of powerful features available within Skytap is the ability to create virtual machine ‘snapshots’. Using the snapshot feature the instructor can ‘save a copy of a machine’ at any time. This feature provides the ability for the instructor’s support staff to unobtrusively help the instructor troubleshoot a student’s lab issue on a cloned copy of the machine while the student can continue on to other labs. Once the solution is discovered on the clone, the support staff can discreetly communicate the fix to the instructor who can then knowledgably instruct the student how correct the issue.

![Fig. 4 Students Access Virtual Machines Using a Web Browser or a Remote Desktop Client](image-url)
Another use of snapshots is to revert a machine back to an earlier state. For example, the instructor could snapshot machines before a lab that demonstrates an irreversible software error. In this way you can allow students broader leeway to experiment.

4.3 Classroom Reuse

Once a set of class labs has been created, they can be saved back into the Skytap library as a ‘template’ of the classroom and easily deployed for future training sessions. Templates can be customized and an instructor may find that they like to adjust the standard training templates used by their colleagues to better support their personal training approach. Rather make these adjustments to each machine in the classroom every time a new classroom is created, the instructor can make these changes once, snapshot these changes, and then use the snapshot as their new template each subsequent time they teach the class.

A template can be created as just one machine or an entire classroom of machines. Skytap has powerful automation and deployment capabilities, so once a template has been created, a new classroom can be deployed through the Web interface in just a few minutes, saving hours of manual set-up time.

5. Skytap Benefits

Skytap provides compelling benefits for any training organization with a hands-on lab component in their classes. The benefits typically cited by training organizations include:

Self-Service Control and Productivity

Instructors have self-service access to create classroom environments on demand. Unlike many traditional training lab vendors there is no need to send an email to acquire access to machines or add new machines to a classroom. Instructors have a greater sense of control since they can add, delete, copy, modify, and power on and off machines on their own. The user interface is easy to learn and simple to use.

Cost Savings

Most traditional training vendors charge by the day so that whether you access machines for 5 minutes or 24 hours you pay the full price. Furthermore, machines typically have to be reserved well in advance and there is little flexibility to change lab size (e.g. add machines or increase hardware resources for individual machines) to mirror changes in student demand.

In contrast, Skytap only charges for the actual minutes that machines run and machines can be added on demand from a large pool of available resources. Since instructors can power them on or off as needed, and features such as ‘auto-suspend’ ensure machines are not left on inadvertently, significant cost savings can be realized.
Student Learning Experience

Students find the use of the virtual classroom environment intuitive. Connecting to their virtual machine via a browser or Remote Desktop client is simple to do. The lab machine can be viewed in full screen mode, making the experience of using the remote lab feel no different than using their own desktop. If the student needs assistance during a lab, the instructor can easily assist. Coupled with a web conferencing solution, Skytap provides the student with an immersive training experience for distance learning.

Zero IT Administration

The IT personnel in your organization responsible for procuring, maintaining, and resetting training machines will be quick to recognize the benefits of using Skytap. The need to constantly upgrade equipment can be eliminated since the potentially heavy processing and memory demands on your lab machines can be handled by the Skytap infrastructure. Labor intensive cloning and software provisioning activities can also be eliminated since software no longer needs to be installed and configured locally on your or your customer’s hardware.

Instructor Collaboration

Instructors are often geographically separated from their peers and miss the opportunity to collaborate with each other. Skytap is an excellent collaboration enablement tool for technical trainers. Instructors can explore lab scenarios and the technical details of a particular software installation together just as if they were sitting together in front of laptop in a conference room without the need to set up a web conference.

6. Conclusions

Taking technical training online without sacrificing the quality of the learning experience is a challenge organizations continue to struggle with. Many companies have yet to expand beyond the use of web conferencing tools for online course delivery. While these tools provide the ability to lecture, present slides and whiteboard concepts, they do not support the hands-on component so vital to effective technical training.

Skytap fills in this gap by providing a hosted computing environment the students can easily access and where the instructor has full control of the classroom. Features such as ‘over the shoulder’ and ‘thumbnail views’ give the instructor a real-time view of what the students are doing and the ability to offer lab assistance when requested.

Skytap can also be used for standard ILT where the instructor is in the same physical classroom as the students. With this model, instructors no longer bear the burden of lengthy classroom pre-configuration tasks. Instead, an organization only needs to provide machines that have an internet connection and a Web browser to access Skytap from the classroom environment.

Whether delivering classes via virtual learning or a traditional classroom environment, Skytap can enable your organization to more efficiently and cost effectively deliver training classes. It provides the missing component of hands-on learning during classes and helps create a genuinely immersive virtual training experience, while removing the burden and expense of costly in-house infrastructure and maintenance.

For more information, interactive demos and pricing for Skytap please visit www.skytap.com or call a customer representative on 1-888-759-8278 (1-888-SKY-TAP8).
About Skytap

Skytap provides Environments-as-a-Service to the enterprise. Our solution removes the inefficiencies and constraints that companies have within their software development and test lifecycles. As a result, our customers release better software faster.

Today’s enterprise is challenged to continuously deliver new customer-facing applications, while overcoming increasing change and complexity in their IT infrastructures. Our customers use Skytap to manage, import, deploy and decommission on-demand environments that contain everything needed to accelerate the software lifecycle, without unnecessary costs and project delays due to manual configuration and dependencies.

Enterprise IT organizations maintain full visibility and cost control, while allowing dev and test teams to self-provision labs, and copy and share complex environments across global cloud regions with ease for a lasting boost in agility.

Customers can import existing virtualized applications or build new applications in the cloud. Skytap can be easily accessed through any modern web browser, REST-based API, Command Line Interface (CLI), or ALM tool (Jenkins, Visual Studio TFS, etc.).

Skytap customers have a choice of infrastructure. Customers can run complex computing environments on Skytap’s native ESX-based infrastructure, or leverage our services atop leading cloud infrastructures such as AWS and Softlayer.

Skytap, Inc.
719 2nd Ave, Suite 300
Seattle, WA 98104 USA
Toll Free: +1-888-SKY-TAP8 (1-888-759-8278)
Web: www.skytap.com

©Skytap, Inc. All rights reserved.