

Getting Started with Citrix VDI-in-a-Box

Design and deploy virtual desktops using Citrix VDI-in-a-Box

Stuart Arthur Brown



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Stuart Arthur Brown is a Pre-Sales Consultant, specializing in VDI. Stuart lives in Cheshire, a county in the north-west of the UK. He has worked in the Citrix reseller channel since the mid 90's, and has been involved with the design and project management of a number of shared and virtual desktop solutions.

Stuart first became aware of Citrix VDI-in-a-Box in 2011, and was hugely impressed with the functionality and simplicity that the product offered; so much so that he changed the focus of his business to become a VIAB solution reseller, working with organizations to help them to successfully implement the technology. Stuart's business, Vitalize Consultancy (http://www.vitalizeconsultancy.co.uk), is working with organizations to help them to make the right decisions with VDI, and can offer skilled consultants and a wide range of complimentary solutions.

I would like to thank my wife, Tamara, and my son, Henry, for their help, support, and encouragement for not only writing this book, but running my own business.

About the Reviewers

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Acknowledgement

I'd like to thank my family for their sacrifices in enduring my years spent in consulting and sales engineering that have contributed to my technical and business expertise. They were instrumental and supportive through the years of my career spent mostly on the road and away from home. Without their support, I would not be where I am in my career now, and have the wonderful opportunities to provide expert reviews on works such as this one.

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Over the past few years, James' focus has been on remote access technologies including Microsoft Direct Access, Citrix VDI-in-a-Box, and Microsoft Lync empowering educators and students to work from home just as well as they can in school.

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Preface

The purpose of this book is to assist you to understand, design, and implement a Citrix VDI-in-a-Box solution. Beginning with a background and introduction to the product, it then moves onto how you should design and size a solution prior to implementation. It then shows you how to build a VDI-in-a-Box solution and concludes with more information on use cases and case studies, before finishing with a chapter on how to test VDI-in-a-Box.

What this book covers

Chapter 1, Background and Benefits of Citrix VDI-in-a-Box, provides a brief introduction to the technology before moving onto an overview of the components of the VDI-in-a-Box software appliance. It also discusses use cases and provides a high-level overview of the configuration process.

Chapter 2, Designing and Sizing Citrix VDI-in-a-Box, provides a comprehensive breakdown of the decision-making process prior to the implementation. There are a number of options to consider, plan, and size required before implementation can begin.

Chapter 3, Building and Configuring Citrix VDI-in-a-Box, aims to work you through a typical VDI-in-a-Box setup starting with the hypervisor installation to the importing of VDI-in-a-Box and the configuration. It also describes some of the more advanced configurations options such as profiles and printing.

Chapter 4, How Organizations are using Citrix VDI-in-a-Box, provides you with details on typical use cases for VDI-in-a-Box to help you to plan how to use it. It also includes a detailed case study showing how a UK-based manufacturing company is using Citrix VDI-in-a-Box to deliver a desktop to users at a satellite office.

Chapter 5, Conducting a Successful Proof of Concept, helps you to plan a proof of concept project, focusing on user acceptance testing. It also contains valuable information to enable you to create a business case.

What you need for this book

To implement Citrix VDI-in-a-Box, you will need your choice of Hypervisor and Citrix VDI-in-a-Box, which you can download from the Citrix web site.

Who this book is for

This book is designed for IT staff who are planning to test and implement Citrix VDI-in-a-Box.

Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.

Code words in text are shown as follows: "We can include other contexts through the use of the include directive."

A block of code is set as follows:

http://[VDIManageraddress]/dt/PNAgent/config.xml.

Any command-line input or output is written as follows:

```
CitrixReceiverEnterprise.exe
```

```
ADDLOCAL="ICA_Client,SSON,USB,DesktopViewer, Flash,PN_Agent,Vd3d" SERVER_LOCATION="https://my.vdi-grid" ENABLE_SSON="Yes"
```

New terms and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "clicking the **Next** button moves you to the next screen".



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1 Background and Benefits of Citrix VDI-in-a-Box

We will cover the following topics in this chapter:

- What is VDI-in-a-Box?
- Where does VDI-in-a-Box fit?
- Brief history of VDI-in-a-Box
- Architecture overview
- What IT challenges can VDI-in-a-Box address?
- High-level overview of the configuration process

This chapter will provide you with the background, architecture, and functionality of Citrix VDI-in-a-Box to enable you to determine how best to utilize it to solve the IT challenges you face.

What is VDI-in-a-Box?

VDI-in-a-Box (**VIAB**) is a software appliance that includes all the features required to deliver server-based, full virtual desktops. Server-based virtual desktops are Windows desktop operating systems running for each user on the server, sending the screen updates to the Citrix client (Citrix Receiver). Citrix can offer multiple ways of delivering desktops and applications in their XenDesktop product, including shared desktop, local virtual desktops, and server-based virtual desktops. VIAB delivers server-based virtual desktops only. The applications can either be installed on the golden image(s), virtualized using application virtualization software, or published from Citrix XenApp.

The first virtual desktop infrastructure (VDI) solutions that emerged were complex in design, made up of a number of connection brokers, management servers, storage interconnects, and shared storage arrays. They were really only relevant to large enterprise organizations who had the skills and budget to implement them. Citrix VIAB has removed a lot of the complexities and cost associated with VDI, and enabled a simple, yet feature-rich VDI that can be used by organizations of all sizes.

The software appliance is based on Linux and runs on top of a hypervisor, on off-theshelf servers, using local storage. VIAB does not require a **storage area network (SAN**), Windows server licenses, or any management servers, which significantly reduces the infrastructure costs associated with typical VDI deployments. As additional appliances are added, they form a grid with each appliance being of equal status.

VIAB enables you to import a Windows desktop image from your chosen hypervisor to create a golden image. This image can be Windows XP, Windows 7 (32 or 64 bit), Windows 8 and even Windows Server 2008R2, or a combination of all of them. It then enables you to edit this image and tune for VDI, removing unnecessary features not required for a virtual session. You can then add applications and from this image, create templates. The templates configuration determines how many desktops are pre-started and available. Users are added to VIAB by connecting to Active Directory servers or using the local workgroup feature.

The design of VIAB means that it can successfully meet the needs of smaller businesses that are keen to reap the benefits of VDI. You can start with as little as 10 users and scale on demand. You can also test it for free before investing in hardware and software. This is a huge advantage over other VDI technologies that require a significant investment in hardware and software to run a trial.

With more than 1 appliance, the VIAB servers form a grid with 1 IP address. Users connect to the grid and are distributed onto the least busy server. In the event of a server failure, the affected users reconnect to the grid, and connect to a desktop on the remaining server. For high availability, Citrix recommends an N + 1 model to ensure there is enough capacity in the grid in the event of a server failure.

Citrix offers the following three ways to connect to VIAB:

- Web browser (VIAB runs a web interface)
- Citrix receiver (HDX client)
- Java client

A brief history of Citrix VDI-in-a-Box

VIAB was bought by Citrix in 2011 from a company called Kaviza, based in California. Kaviza was an IT technology start-up business, partly funded by Citrix. The first version of VIAB was released in 2009, and included a licensed version of Citrix HDX as the display protocol, alongside Microsoft RDP for those who didn't want to pay for Citrix HDX.

When Kaviza was formed in 2008, their goal was to reduce the costs and complexities associated with VDI solutions. They strongly believed that the need for shared storage, numerous management servers, and connection brokers was hindering the adoption of VDI. They therefore set out to develop a simpler, software appliance-based solution that could deliver server-based VDI desktops.

VIAB won a series of awards and was successfully implemented across the globe in a very short space of time. In 2011 Citrix – the global leader in desktop virtualization – acquired Kaviza and created a new division called SMB Solutions, which became home for the Kaviza employees. Citrix released VDI-in-a-Box 5.0 in October 2011. The current version is 5.2, with plans for 5.3 to be released in Q3 2013.

Where does VDI-in-a-Box fit?

VIAB was the vision of a group of clever, experienced IT professionals, who believed that VDI did not need to be complex and require significant investments in shared storage, making it expensive to implement.

VIAB delivers server-based VDI sessions only, so once you have decided you want to virtualize your desktop, you need to determine the following aspects.

Which set of our user base requires a full virtual desktop?

It is important to distinguish between virtual desktops and shared desktops. VIAB delivers virtual desktops only. As we have said a virtual desktop runs a copy of a Windows desktop operating system for each user. This could either be Windows XP, Windows 7 (32 or 64 bit), Windows 8 or Windows 2008 R2, Windows Server 2012, or a combination of each. A shared desktop solution is based on Windows **Remote Desktop Services (RDS)**, which used to be called Terminal Services and publishes a desktop or applications to users. The applications are either virtualized or installed on the

RDS server.

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Server-based virtual desktops have many advantages over shared desktops, including the following:

- Users can install their own applications
- There are fewer application incompatibility issues
- Users can have a persistent desktop

Microsoft license shared desktops and virtual desktops in different ways which can affect the cost of VDI solutions.

Do we need offline capabilities?

If you need users to be able to access their desktops offline then VIAB cannot be used as it only delivers server-based virtual desktops. Therefore, there needs to be a network connection between the appliance and the user's device. An offline desktop runs locally on the device and can operate without a network connection.

Which devices do we need to connect?

VIAB uses Citrix HDX, which is the protocol used by all Citrix's VDI solutions. HDX, formerly known as ICA, is a free download from the Citrix website and available for a huge array of devices, including Apple and Linux. The vast majority, if not all thin clients, support Citrix HDX too.

Do we have enough bandwidth?

Citrix HDX is extremely efficient on bandwidth usage and can be delivered effectively across most types of networks including ADSL and Wi-Fi. If your users require a high multimedia content and so on, they will use more bandwidth. There are a number of tools and guides on the Citrix website to help with bandwidth analysis that are quite useful when determining bandwidth requirements.

The following link provides more information: http://support.citrix.com/ article/CTX126191.

At a recent VIAB workshop, we demonstrated two concurrent VIAB connections via a mobile phone (3G connection), and the sessions ran at LAN speed.

Do we want to deliver persistent or non-persistent desktops?

Virtual desktops can either be persistent or non-persistent. Persistent means that any changes made by the user are stored, so that when they log off and on again, their desktop remains how they left it. Non-persistent desktops are when a user logs off, their desktop is destroyed and they are presented with a fresh build each time they log on.

There is a lot of debate about this, and it is an important design issue to address. VIAB essentially allows both environments and also supports an innovative feature called pooled and personal desktops. A pooled desktop is refreshed regularly to provide the user with a fresh build. This has huge advantages in terms of desktop speeds and simplified management. Pooled desktops can be personalized to each user with the user profiles, so in most cases, persistent desktops may not be required. If you want users to be able to add their own applications to their desktop. VIAB has a great new feature that came out in Version 5.1 called personal desktops. This is a clever technology, originally developed for Citrix XenDesktop, which enables administrators to configure a personal vDisk for users who require a personal desktop. Users with a personal desktop can then install their own personal applications in their vDisk, and VIAB will connect the vDisk to the desktop image it creates, forming the persistent desktop for the user. This can be a very useful feature to enable more savvy users to install their own applications, which may be unique to them.

VIAB can also deliver persistent desktops from pooled desktops by enabling IT to never refresh the desktop, allowing the user's desktop to continue to run at all times on the appliance. However, when the appliance is rebooted this desktop will be lost.

Architecture overview

The software appliance uses local disks rather than an SAN, which enables greater scalability and reduces costs. Citrix support the three main bare metal hypervisors, including the following:

- Citrix XenServer (free version)
- Microsoft Hyper-V 2008 R2 and 2012 (free version)
- VMware vSphere ESXi (chargeable versions)



We are referring to the bare metal version of Microsoft Hyper-V, which sits directly on the hardware without the need for a chargeable Windows server operating system. You can run Hyper-V as a server role on a full version of Windows server, but that is not required for VIAB. Once the hypervisor is installed, the VIAB software appliance is imported. Once imported, you can configure the appliance and create the grid.

The appliance includes all the functions required to deliver server-based virtual desktops, including the following:

- Connection brokering
- Dynamic provisioning
- High availability
- Load balancing
- On-demand scaling
- Citrix HDX
- Linked clones

What IT challenges can VDI-in-a-Box address?

Citrix VDI-in-a-Box can be used to solve a number of IT challenges, including the following:

PCs in need of refreshing

When PCs come to the end of their lives, many IT managers don't automatically order replacement PCs, choosing to look at alternative solutions. PC refresh time is therefore an ideal opportunity to look at Citrix VIAB to investigate the potential benefits that server-based VDI can bring. By running the desktops in the data center, older PCs can act as display devices, extending their useful life.

Upgrading from Windows XP to Windows 7 / Windows 8

When planning an upgrade to Windows 7 / Windows 8 from XP, there is an ideal opportunity to consider VIAB. By centralizing the desktops using VDI, you can simplify the desktop OS migration greatly, without having to replace any of the Windows XP machines.

Delivering and supporting desktops to satellite offices / home users

The time taken supporting desktops at different sites can be significant, and when the need arises IT managers often look at VDI. By centralizing the desktops, the IT support team have better tools to support, manage, and secure desktops to users in different locations and potentially from home. You can either locate the VIAB appliance centrally, and send the screen displays across the WAN or deploy an appliance(s) to the remote site, and support the appliance(s) across the WAN. VIAB does have its own workgroup facility to create local accounts on the appliance when you don't wish to connect to Microsoft Active Directory, which can be useful for remote sites. It also supports kiosk mode and can deliver a standard desktop that can be refreshed on log out without any user credentials required.

With Citrix Access Gateway, you can enable secure SSL connections from remote devices across the internet to your VIAB servers. Enabling users to access their desktop and applications more flexibly can also significantly increase productivity.

Citrix VIAB includes much of Citrix's HDX functionality, which is a low bandwidth protocol and ideal for low bandwidth connections such as wide area networks, broadband, and Wi-Fi. It also has many features to improve multimedia and peripheral support to provide users with a local PC-like experience.

BYOD (bring-your-own-device)

There is a lot of talk about the consumerization of IT with users keen to access their corporate desktop from their personal devices, for example, iPads, Windows tablets / laptops and so on. Just recently, it was announced that the sales of tablet devices has outstripped PCs. VIAB could prove a good solution here, if you need to publish the whole corporate desktop to devices such as tablets and mobile phones. We will talk more about Citrix HDX and the vast number of devices it can support later.

Delivering cloud services

VIAB is being used by cloud providers to deliver both Windows desktops and Windows servers to vast numbers of users around the globe. Therefore, it could be considered by cloud providers wishing to sell Desktop and Windows as a service.

A high-level overview of the configuration process

One of the first decisions to make is what hardware will you use to run the software appliance. If you are planning to run a trial of VIAB that you will destroy and then start from scratch, you have vast choices. You can use a workstation, laptop, or small server for test purposes. As long as your test device can run the hypervisor and supports virtualization, it can be utilized.

Citrix offers a 30-day trial of VIAB to enable organizations to test the solution. You can download this from the VIAB microsite on the Citrix website. Click on the **Try it** button at the top of the page, and create an account if you don't already have one. You then download the version of VIAB you need, depending on your hypervisor choice. This is a very important decision, and we will discuss this in much more detail later. You have to use the same hypervisor for all the servers in the grid.

You can add a production license to a VIAB trial anytime, even after the evaluation license has expired, and build the production system from the trial appliance.

Once you have selected a test server, you can install the hypervisor. This will wipe everything off the server and install a bare metal hypervisor. Once the hypervisor is installed, you can import the VIAB software appliance. All the hypervisors have management consoles, which you can use to manage them.

Once imported, VIAB will guide you through some simple steps to set up the grid. You then need to create a Windows image in your chosen hypervisor. Once created, you can import this into VIAB and edit the image with your chosen set of applications.

Once you have a Windows golden image, you can create templates from that image. Templates are simple to configure. They enable you to decide how many desktops to start, how much memory to enable and CPU to allocate to each desktop, and whether they are pooled or personal desktops.

Users are then allocated to templates. You can import users from Active Directory, or you can input local users into the built-in workgroup facility. Users can be allocated to more than one template if required.

VIAB has an administration console, but this is not regularly used. When you perform administration tasks, you typically place the appliance into deactivated mode to prevent users from connecting to it, and then you can run through any updates and so on, prior to activating. As all the appliances form a grid, it doesn't matter which appliance you connect to. All the changes you make will be passed through the grid automatically. Therefore, if you create a new image or update an image, this will update on every appliance in the grid.

Summary

In this chapter, we have provided you with a background and introduction to Citrix VIAB.

We have looked at what VIAB can and cannot do, and examined some of the most common use cases. We finished this chapter with a high-level overview of the configuration process to illustrate how relatively simple it can be to get started with Citrix VIAB, compared to other VDI solutions.

In the next chapter, we will cover how to design and size a VIAB solution.

2 Designing and Sizing Citrix VDI-in-a-Box

We will cover the following topics in this chapter:

- Sizing the servers
- RAID 1 or 0
- Choosing the hypervisor
- Data stores
- Pooled and personal desktops
- Microsoft activation
- Applications
- Golden images
- VDI-in-a-Box templates
- Profile management
- Bandwidth
- Printing
- Antivirus
- High availability
- Disaster recovery
- **OEM**

This chapter will provide you with the knowledge that you need to successfully design and size a Citrix VIAB solution. It will look at many of the options you will face during your use of VIAB, because it is better to plan for all eventualities before you begin to ensure that you make the best decisions.

Sizing the servers

There are a number of tools and guidelines to help you to size Citrix VIAB appliances. Essentially, the guides cover the following topics:

- CPU
- Memory
- Disk IO
- Storage

In their sizing guides, Citrix classifies users into the following two groups:

- Task workers
- Knowledge workers

Therefore, the first thing to determine is how many of your proposed VIAB users are task workers, and how many are knowledge workers?

Task workers

Citrix would define **task workers** as users who run a small set of simple applications, not very graphical in nature or CPU- or memory-intensive, for example, Microsoft Office and a simple line of business applications.

Knowledge workers

Citrix would define **knowledge workers** as users who run multimedia and CPUand memory-intensive applications. They may include large spreadsheet files, graphics packages, video playback, and so on.

CPU

Citrix offers recommendations based on CPU cores, such as the following:

- 3 x desktops per core per knowledge worker
- 6 x desktops per core per task user
- 1 x core for the hypervisor

These figures can be increased slightly if the CPUs have hyper-threading.

You should also add another 15 percent if delivering personal desktops.



The sizing information has been gathered from the Citrix VIAB sizing guide PDF.

Example 1

If you wanted to size a server appliance to support 50 x task-based users running pooled desktops, you would require 50/6 = 8.3 + 1 (for the hypervisor) = 9.3 cores, rounded up to 10 cores.

Therefore, a dual CPU with six cores would provide 12 x CPU cores for this requirement.

Example 2

If you wanted to size a server appliance to support 15 x task and 10 x knowledge workers you would require (15/6 = 2.5) + (10/3 = 3.3) + 1 (for the hypervisor) = 7 cores.

Therefore, a dual CPU with 4 cores would provide 8 x CPU cores for this requirement.

Memory

The memory required depends on the desktop OS that you are running and also on the amount of optimization that you have done to the image.

Citrix recommends the following guidelines:

- Task worker for Windows 7 should be 1.5 GB
- Task worker for Windows XP should be 0.5 GB
- Knowledge worker Windows 7 should be 2 GB
- Knowledge worker Windows XP should be 1 GB

It is also important to allocate memory for the hypervisor and the VIAB virtual appliance. This can vary depending on the number of users, so we would recommend using the sizing spreadsheet calculator available in the **Resources** section of the VIAB website. However, as a guide, we would allocate 3 GB memory (based on 50 users) for the hypervisor and 1 GB for VIAB. The amount of memory required by the hypervisor will grow as the number of users on the server grows.

Citrix also recommends adding 10 percent more memory for server operations.

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Example 1

If you wanted to size a server appliance to support 50 x task-based users, with Windows 7, you would require $50 \times 1.5 + 4 \text{ GB}$ (for VIAB and the hypervisor) = 75 GB + 10% = 87 GB.

Therefore, you would typically round this up to a 96 GB memory, providing an ideal configuration for this requirement.

Example 2

Therefore, if you wanted to size a server appliance to support 15 x task and 10 x knowledge workers, with Windows 7, you would require (15 x 1.5) + (10 x 2) + 4 GB (for VIAB and the hypervisor) = 75 GB + 10% = 51.5 GB.

Therefore, a 64 GB memory would be an ideal configuration for this requirement.

Disk IO

As multiple Windows images run on the appliances, disk IO becomes very important and can often become the first bottleneck for VIAB.Citrix calculates IOPS with a 40-60 split between read and write OPS, during end user desktop access.Citrix doesn't recommend using slow disks for VIAB and has statistic information for SAS 10 and 15K and SSD disks.The following table shows the IOPS delivered from the following disks:

Hard drive RPM	IOPS RAID 0	IOPS RAID 1
SSD	6000	
15000	175	122.5
10000	125	87.7

The following table shows the IOPS required for task and knowledge workers for Windows XP and Windows 7:

Desktop IOPS	Windows XP	Windows 7
Task user	5 IOS	10 IOPS
Knowledge user	10 IOPS	20 IOPS

Some organizations decide to implement RAID 1 or 10 on the appliances to reduce the chance of an appliance failure. This does require many more disks however, and significantly increases the cost of the solution.

SSD

SSD is becoming an attractive proposition for organizations that want to run a larger number of users on each appliance. SSD is roughly 30 times faster than 15K SAS drives, so it will eliminate desktop IO bottlenecks completely. SSD continues to come down in price, so can be well worth considering at the start of a VIAB project.

SSDs have no moving mechanical components. Compared with electromechanical disks, SSDs are typically less susceptible to physical shock, run more quietly, have lower access time, and less latency. However, while the price of SSDs has continued to decline, SSDs are still about 7 to 8 times more expensive per unit of storage than HDDs.

A further option to consider would be **Fusion-IO**, which is based on NAND flash memory technology and can deliver an exceptional number of IOPS.

Example 1

If you wanted to size a server appliance to support 50 x task workers, with Windows 7, using 15K SAS drives, you would require 175/10 = 17.5 users on each disk, therefore, 50/17. $5 = 3 \times 15K$ SAS disks.

Example 2

If you wanted to size a server appliance to support 15 x task workers and 10 knowledge workers, with Windows 7, you would require the following:

- 175 / 10 = 17.5 task users on each disk, therefore 15 / 17.5 = 0.8 x 15K SAS disks
- 175/20 = 8.75 knowledge users on each disk, therefore $10/8.75 = 1.1 \times 15K$ SAS disks

Therefore, 2 x 15K SAS drives would be required.

Storage

Storage capacity is determined by the number of images, number of desktops, and types of desktop. It is best practice to store user profile information and data elsewhere.

Citrix uses the following formula to determine the storage capacity requirement:

2 x golden image x number of images (assume 20 GB for an image)

- 70 GB for VDI-in-a-Box
- 15 percent of the size of the image / desktop (achieved with linked clone technology)

Example 1

Therefore, if you wanted to size a server appliance to support 50 x task-based users, with two golden Windows 7 images, you would require the following:

- Space for the golden image: 2 x 20 GB x 2 = 80 GB
- VIAB appliance space: 70 GB
- Image space/desktop: 15% x 20 GB x 50 = 150 GB
- Extra room for swap and transient activity: 100 GB
- Total: 400 GB
- **Recommended**: 500 GB to 1 TB per server

We have already specified 3 x 15K SAS drives for our IO requirements. If those were 300-GB disks, they should provide enough storage.

RAID 0 versus RAID 1 versus RAID 10

When you are designing your appliance(s), you need to decide what RAID level you want to add to each appliance. How available do you want your VIAB appliances to be? Citrix recommends an N + 1 model for all types of deployments. Therefore, you should never rely on just one server, even if you are deploying a small number of users. We will discuss N + 1 later in the chapter. If you wish to add RAID 1 or 10 to your appliance, you will require many more disks, which will push up the costs, but it will provide you with higher availability and less disruption to users in the event of a disk failure. You also need to consider any IOPS degradation with RAID and use the spreadsheet configurator to provide the correct amount of disks required.

Example 1

If you wanted to size a server appliance to support 50 x task workers, with Windows 7, using 15K SAS drives in a RAID 0 configuration, you would require 175 / 10 = 17.5 users on each disk, therefore 50 / 17.5 = 3 x 15K 300 GB SAS disks.

If RAID 10 was required for the same number of users, *10 x 15K SAS drives* would be required, which is a significant increase.

Example 2

If you wanted to size a server appliance to support 15 x task and 10 x knowledge workers, with Windows 7, you would require the following:

- 175/10 = 17.5 task users on each disks, therefore 15/17.5 = 0.8 x 15K SAS disks
- 175/20 = 8.75 knowledge users on each disk, therefore $10/8.75 = 1.1 \times 15K$ SAS disks

Therefore, 2 x 15K SAS drives would be required.

If RAID 10 was required for the same number of users, *6 x 15K SAS drives* would be required, which is a significant increase.

Choosing the right hypervisor

Citrix offers a choice between the following:

- Citrix XenServer: This is a free edition
- Microsoft Hyper-V 2008 R2 and 2012: This is a free edition
- VMware ESXi/vSphere client: This is one of the chargeable editions

We are referring to the free bare-metal hypervisor, **Hyper-V**, not a full copy of Windows with Hyper-V as a role. Choosing the right hypervisor for your environment is very important, particularly if you decide to extend your pilot to a production environment. Many organizations may have a preference, or are already using one of the hypervisors for server virtualization. We would recommend that organizations need to know how they intend to use VIAB, prior to deciding which hypervisor to use. Some hypervisors will deliver slightly better performance than others on certain types of hardware, but it is hard to determine this without testing, which is usually time-consuming. Many organizations choose XenServer to keep the solution all-Citrix. You also get a free upgrade to XenServer Enterprise when you install VIAB. It is important to check the Citrix XenServer hardware compatibility list to see whether you can run your chosen version of XenServer on your hardware. If you decide to use different data stores, you will currently need to consider either Microsoft Hyper V 2012 or VMware, as Citrix XenServer doesn't currently support this feature. Additionally, if you decide to locate your VIAB appliances at different locations, you may consider VMware, as it can transfer image updates as delta's changes, rather than sending the whole image. You can't mix and match hypervisors in the grid. All appliances need to be running the same hypervisor. Also, if you start with a small test server and decide to expand it out into a production environment, you will need the same hypervisor for all the appliances in the grid.

Data stores

With the release of Citrix VIAB 5.2, you have the option of using three data stores. This has been designed to enable you to store the golden images on SAS drives and use SSD to run the desktop instances. It also allows you to store personal vDisks on a shared storage, removing the need for manual backups of personal desktops.

This will be of particular interest if you are planning larger VIAB deployments, or are planning to deliver personal desktops.

Pooled and personal desktops

Citrix VIAB Version 5.2 supports both pooled and personal desktops. A pooled desktop is typically refreshed regularly and provides a clean desktop image for each user. When the user's profiles are applied, they will see their personalization, but any changes they make, such as installing software, will be lost once the desktop is refreshed. This is perfect for organizations that simply want to deliver a set of authorized applications to users and do not want them to add additional applications.

Personal desktops are a combination of a pooled desktop and the user's personal disk (vDisk). Each user is presented with a fresh image of Windows, with their personal vDisk linked to it when it is created. The vDisk is of a configurable size (10-60 GB) and allows users to install their own software, with the only restriction being the size of the allocated vDisk. The vDisk can be increased if required.

As we mentioned in the *Data stores* and *Choosing the right hypervisor* sections, organizations would ideally store the vDisks in the third data store, which would be a file server or SAN which is backed up. You can manually back up the personal vDisks too, if required.

Microsoft activation

With Windows VDI, you cannot use OEM licenses for Windows or Office, and therefore require a method of activating both of these products in a VDI environment. Volume activation was introduced with Windows 7. Volume-licensed versions of Windows XP do not require activation.

Microsoft offers two methods for this; they are discussed in the next sections.

Multiple Activation Key (MAK)

MAK is not recommended for most VIAB deployments; however, it can be used for deployments with less than 25 unique computers, physical or virtual, that connect every 30 days.

Key Management Server (KMS)

KMS is the preferred method for VIAB and offers unlimited activations. When desktops are refreshed in VIAB, they go through a Sysprep process that requires activation. This could potentially happen more than once a day. If you have an existing KMS server, you can point the VIAB grid to that.
KMS is also the preferred method for Microsoft Office activation. You can read more about setting up KMS at http://technet.microsoft.com/en-us/library/ee355153.aspx.

Applications

Although VIAB runs a copy of a Windows desktop operating system for each user, it is still wise to test the applications that you want to deliver during a proof of concept, as it is possible that you could run into application issues.

Testing the applications will also help you to decide how many golden images you will require. Most organizations will install the applications on the golden images as they would on a local PC; however, there are other options available, such as the ones discussed in the next two sections.

Application virtualization

You may decide to virtualize the applications using an application virtualization tool, for example, Microsoft App-V. This will convert the application into an executable that runs on the desktop, but isn't installed. This has the advantage of limiting application conflicts, especially if it is necessary to run multiple versions of the same application (for example, Office 2003 and Office 2013 on the same VM).

Published applications

You can also run the applications on Citrix XenServer and publish the application's icon to the desktop. Therefore, if you have an existing XenServer farm, you can continue to utilize it.

How many golden images do you need?

The golden image is created in VIAB when you import your Windows image from the hypervisor. Citrix recommends that you keep a copy of the base image without any applications and then copy it to create new images. The number of golden images required is a design question. If you have different groups of users that require different sets of applications, you may decide to have different images for each user group. However, this means there are more images to patch and update, which will take more maintenance time. You can use profile management solutions to enable one golden image to display different application icons to different user groups, enabling you to use a single image. If you decide to edit an image, always keep a copy of the original image, just in case you damage the image, or run into any problems. You can create test templates from your latest image to enable a small group of users to test the new image before it is rolled out to all the users.

You may also require different Windows operating systems for different user groups. Windows XP requires less memory than Windows 7, and therefore, may be the choice for users who do not require Windows 7. You may also decide to test Windows 8 for some users and create a Windows 8 image. The next version of VIAB will provide full HDX support for Windows 8; currently it is limited to RDP in Version 5.2. At least one image for each operating system will be required.

VIAB templates

Once you have decided how many golden images you require, you then need to determine how you will configure your templates. Templates are created from golden images and provide you with some additional configuration options. Template design is an important stage in the design of your VIAB solution. Once you know what you can configure within the template screen, you can determine how many templates you require for your implementation.

Templates allow you to configure components as discussed in the next sections.

Template name

Prior to the implementation of VIAB, you will ideally choose the names for your templates. This would typically equate to the group of users, for example, "sales" or "class 1". You then choose the prefix and suffix to enable you to monitor your user's activity in the **Desktops** tab.

Memory allocated

You can select how much memory each desktop user can take for that template. For example, you may decide to give task workers 1.5 GB of memory and knowledge users a memory of 2 GB for a Windows 7 desktop. You may have a super user that requires 4 GB memory for their desktop. It is vital to go through this in the planning stages to enable you to accurately size your VIAB appliance servers.

Virtual CPUs

You can select how many virtual CPUs you wish to allocate to each desktop in the template. A virtual CPU, by default, equates to 1/6 of a physical core. Therefore, a task worker would typically be allocated 1 x virtual CPU (6 x desktops per physical core) with a knowledge worker allocated with 2 x virtual CPUs (3 desktops per physical core).

You can configure the ratio of virtual CPUs to physical CPU cores if required.

Connect to local drives and devices

This option allows you to choose the drives and devices that you want your VIAB virtual desktop to connect to for the users in that template. These include the following:

- Local disk drives
- USB sticks
- Local printers
- Smart cards
- Other USB devices, for example, scanners, cameras, and so on
- Serial ports

Color depth

You can then choose the color depth. This may become a useful option if you are delivering desktops across low bandwidth connections and would like to reduce the amount of data sent across the WAN.

Maximum and prestarted desktops

This allows you to determine how many desktops are allowed for each template, based on the number of users who use the template. It will also allow you to decide how many desktops should be prestarted and available. If users connect at random times, you may set this to a low number; however, if your users can all connect at the same time, you may decide to prestart all the desktops. Once a user connects to a desktop, another one is started.

You can start more desktops than you are licensed for, which could be very useful for an organization, such as a school, where users are regularly logging off and on again.

Profile management

Citrix VDI-in-a-Box will work with whatever profile management tools you use for your PC environment. The user's profile, preferences, cookies, favorites and so on are typically stored on a file server or in a profile management application. Citrix VIAB includes Citrix profile management which can be used.

Citrix VIAB supports user personalization by using roaming profiles and folder redirection in Active Directory. Or, you can use profile management tools from third-party providers. You should also consider Windows UE-V, which is included in **Microsoft Desktop Optimization Pack** (**MDOP**). You qualify for MDOP when you have software assurance or VDA (Microsoft's virtual desktop license).

Profile management is a very important consideration when designing a VIAB solution. Please take time to test this during your trial and look at third-party products if required.

Bandwidth

If you are planning to deliver VIAB sessions across low bandwidth connections, for example, a 3G connection or remote office, it is important to go through the bandwidth requirements and make sure that you test your user's bandwidth usage during a trial.

Citrix VIAB uses the HDX protocol, as used in Citrix XenApp and Citrix XenDesktop. Detailed information about HDX can be found on the Citrix website, which provides lots of information on the estimated bandwidth usage.

Citrix HDX can enable multimedia redirection, which means that videos and other similar media can stream across the network and can be displayed in the local media player.

The following table provides useful guidelines on bandwidth usage.



The following table is referenced from Citrix VDI user bandwidth requirements..

- [27] ·

Parameter (medium workloads)	Native Bandwidth
Office based	43 kbps
Internet	85 kbps
Printing	174 kbps
Flash video	174 kbps
Standard WMV Video	464 kbps
High Definition WMV	1812 kbps

You can improve the bandwidth usage with Citrix branch repeater, which may be a consideration.

If you are considering deploying VIAB sessions to satellite offices, you may consider locating the VIAB appliance(s) at the satellite site and supporting them across the WAN.

Printing

VIAB includes a full range of Citrix tools to aid in printing and printer redirection – a feature of Citrix HDX. Printer redirection will connect all the printers available on the client device into the virtual desktop. This supports all types of printers including local, network, and wireless.

If the local device does not have the ability to use the required printers, for example, a mobile device or thin client, other connection methods can be used.

Citrix VIAB enables organizations to use the Citrix **Universal Print Server** (**UPS**). This should work with most printers and can significantly reduce the amount of printer bandwidth used. To enable Citrix UPS, you would add modules to the following:

- Print and document services running on Windows
- Citrix HDX group policy running on Windows Active Directory
- Install the UPS client on the VIAB golden images

Planning how you will deliver printing and testing the Citrix universal print driver is an important stage in a pilot project.

Antivirus (AV) for VDI

Some organizations may decide that they do not require antivirus software on their VDI desktop if they are protecting the gateway and similar components. They may also feel that if they get a virus, they can delete the affected desktop and generate a new one (from the golden image itself which should never get infected). However, most organizations will probably implement an AV software on the virtual desktops for peace of mind and to protect users from potential malicious attacks.

When implementing AV in virtual desktops, you need to take a lot of care when choosing which product to use or continuing to use your existing products. Remember that each time a desktop is refreshed, it will need to update its antivirus definitions, increasing the disk IO load during desktop generation. Antivirus software clients can also be quite large, taking up to 200 MB of memory on each desktop. When you have 50 desktops running on a VIAB appliance, it adds up.

It is worth considering VDI-aware antivirus products that can offload the antivirus scanning onto an appliance to reduce the amount of memory consumed by antivirus clients. It would also not require each desktop to update its definitions each time it was refreshed.

Citrix has a certification process for antivirus providers to help organizations to select the best product for VIAB.

The Citrix-ready program has a website that you can at https://www.citrix. co.uk/partner-programs/citrix-ready.html.

High availability (N + 1)

Always make sure in your design that you have high availability. Citrix recommends that organizations always add an extra server to the grid so that in the event of a server failure, users can reconnect to the grid and a desktop will be created on one of the remaining servers in the grid.

Example 1

If you wanted to design a VIAB solution to support 50 x task-based users, with Windows 7, using 15K SAS drives in a RAID 0 configuration, you would require 2 x servers with the following:

- 10 CPU Cores
- 87 GB Memory
- 3 x 15K SAS disks

The 50 users will be spread across both servers. VIAB has a grid IP address so that all the clients connect to the grid. They are then allocated to the least busy server and connect to a desktop. Let's say there are 25 users on server A and 25 users on server B. If server A fails, all users with desktops running on server A will crash and users will lose any work that hasn't been saved.

VIAB will know that server A has crashed and it will automatically start desktops for the users who were connected to server A. Users will then reconnect to the grid and be allocated a desktop from server B. Server B will be capable of running 50 x desktops whilst server A is fixed and added back into the grid.

Once added back to the grid and activated, server A will start to accept user connections again, spreading the load.

Disaster recovery

The design of VIAB enables **disaster recovery** (**DR**) features and Citrix is planning to add a cloud-based DR feature in subsequent releases of the product. As a minimum, all organizations who use VIAB should consider a small VIAB appliance, located offsite, which is joined to the grid. This means that it is up-to-date with the images created, but it doesn't have to accept user connections and can run in the deactivated mode.

In the event of the loss of the VIAB grid, organizations could use the offsite appliance to quickly build a new grid. Once you have purchased replacement servers for the grid, you would simply install the hypervisor on each server, import VIAB, and join the grid. Each server would then copy across all the images and so on from the VIAB DR appliance and could then be activated to accept user connections.

If you require immediate availability, you could locate appliances in different locations, always ensuring that in the event of a site going offline, you have appliances available on the Wide Area Network for users to connect to.

OEM

Citrix VIAB can be purchased as an OEM with server hardware from the main server hardware providers, including DELL, HP, IMB, and Fujitsu. Server hardware vendors typically offer purpose-built appliances that they have tested and designed for certain numbers of users. They may also offer thin clients to provide organizations with a support number to call for an end-to-end VDI solution.

It may well be worth considering OEM options when designing your VIAB solution, which has the advantage of a tested and approved limits on the number/type of users per appliance.

Summary

In this chapter, we have gone through many of the design issues associated with a VIAB deployment. It is vital that the servers are sized correctly and you understand how to configure the templates. Windows profiles and printing are important considerations too and worthy of thought prior to a pilot project or proof of concept.

With much of this design work done, the implementation will be more straightforward.

3 Building and Configuring Citrix VDI-in-a-Box

This chapter will cover the following topics:

- Installing the hypervisor
- Importing Citrix VDI-in-a-Box
- Creating the VDI-in-a-Box grid
- Creating the first Windows image
- Creating templates from your image
- Assigning templates to users, groups, and IP addresses
- Testing the connection as a user
- SSL
- Grid IP
- Kiosk mode
- Licensing VDI-in-a-Box
- Connecting to the grid
- Citrix Profile Management
- Using NetScaler VPX with VDI-in-a-Box
- Citrix GotoAssist integration with VDI-in-a-Box
- ShareFile
- Reusing old PCs

- Thin clients
- Connecting from mobile devices
- Supporting Citrix VDI-in-a-Box

This chapter provides you with a step-by-step guide to help you to build and configure a VIAB solution; starting with the hypervisor install, through to importing VIAB and creating your first desktop image and templates.

It then goes onto to cover adding an SSL certificate, the benefits of using the GRID IP Address feature, and how you can use the Kiosk mode to deliver a standard desktop to public access areas.

It then covers adding a license file and provides details on the useful features contained within Citrix profile management. It then highlights how VIAB can integrate with other Citrix products such as NetScaler VPX, to enable secure connections across the Internet and **GoToAssist**, a support and monitoring package which is very useful if you are supporting a number of VIAB appliances across multiple sites. **ShareFile** can again be a very useful tool to enable data files to follow the user, whether they are connecting to a local device or a virtual desktop. This can avoid the problems of files being copied across the network, delaying users.

We then move on to a discussion on the options available for connecting to VIAB, including existing PCs, thin clients, and other devices, including mobile devices. The chapter finishes with some useful information on support for VIAB, including the support services included with subscription and the knowledge forums.

Installing the hypervisor

All the hypervisors have two elements; the bare metal hypervisor that installs on the server and its management tools that you would typically install on the IT administrator workstations.

Bare Metal Hypervisor	Management tool
Citrix XenServer	XenCenter
Microsoft Hyper-V	Hyper V Manager
VMware ESXi	vSphere Client

It is relatively straightforward to install the hypervisor. Make sure you enable linked clones in XenServer, because this is required for the linked clone technology. Give the hypervisor a static IP address and make a note of the administrator's username and password.

You will need to download ISO images for the installation media; if you don't already have them, they can be found on the Internet.

Importing Citrix VIAB

You can download the VIAB software appliance from the download section of the Citrix website. There is a version for each of the three hypervisors, so make sure that you download the right one.

Prior to importing VIAB, make sure that you have the following information:

- The administrator username and password for the hypervisor
- DHCP server on the network
- If you are using MAK activation, you need a Windows volume license key, although not immediately required
- If you are using KMS, you need a KMS server that has already activated at least 25 desktops, although not immediately required
- IP addresses and user ID/passwords for all you Microsoft Active Directory servers

Download the correct version of the appliance, click on **Install**, and save the ZIP file. You then need to extract the ZIP file.

Then, from the hypervisor management software, import the appliance into the hypervisor. This is slightly different for all three hypervisors, so it is best to follow the relevant Citrix eDocs to ensure you follow the correct stages.

Creating the Citrix VIAB grid

Your DHCP server will have allocated an IP address to your VIAB appliance, so find out what it is in the hypervisor management tool by connecting to the remote display on the virtual machine. Once you have found out the IP address, type the following string into a browser:

https://<IPaddress>/admin

This will connect you to the VIAB management console. Accept the certificate as trusted each time it asks you. Then perform the following steps:

- 1. In the **Username** box, type vdiadmin.
- 2. In the **Password** box, type kaviza.
- 3. You will now see the following four steps to go through:
 - 1. Set up your hypervisor and grid
 - 2. Generate a base desktop image
 - 3. Create desktop templates from the image
 - 4. Assign users to desktops

Setting up the Hypervisor and Grid

The first thing to do is to connect VIAB to the hypervisor that it is running on. You will need to input the IP address, user ID, and password for the hypervisor.

The next screen asks you to set up the data store(s). You can configure up to three data stores in Hyper v 2012 and ESXi: one for images, one for desktops, and one for personal vDisks. Select the network label for each data store and save it.

You can then either join a grid, or set up the grid. If you are setting a grid up for the first time, you will need to input your Microsoft Active Directory server details. The user account will require domain administration privileges. VIAB can now contain numerous AD servers, in case there is a failure. If you do not want to join a Microsoft domain, you can select a workgroup and use the local workgroup feature of VIAB. You will then need to create user accounts for this later.

It will then ask if you have reserved an IP address for your VIAB appliance. It is important that you do this and later allocate your VIAB appliance a permanent IP address. This is done in the admin console. You will need to deactivate your server and add the fixed IP address before reactivating it.

Also, remember to change the admin password to a secure password.

If you wish to join an existing grid, simply input the user ID and password for one of the existing appliances in the grid and the appliance will automatically join the grid.

Creating the first Windows image

Prior to importing a Windows image into VIAB, you will need to create an image in your chosen hypervisor. This is slightly different for each hypervisor, so please follow the documentation. You may be able to take an image from an existing physical machine and virtualize it; however, this is not recommended, as it is better to start with a clean image. Building a Windows desktop inside a hypervisor is very similar to installing it on a PC. Make sure that you have the latest service packs and hotfixes, which may require numerous reboots to install.

It is important to check the following, else you could be waiting a while to be told the import has failed.

- The virtual machine is running, Windows XP, Windows 7 (32 or 64 bit), Windows 8, or Windows Server 2008 R2.
- The **Remote Desktop Connection** (**RDP**) functionality is enabled on the virtual machine. This allows VIAB to initially connect to the desktop, during the import process.
- The virtual machine has only one **network interface card** (NIC) and it must be assigned to Device 0.
- The virtual machine only has one disk image.
- The virtual machine is started and in a powered-on state before importing into VDI-in-a-Box. If it is not powered, VIAB will say it can't import the image.
- The virtual machine has at least 4 GB of disk space available.
- The Local Administrator account is enabled on the virtual machine, as VIAB requires this during the import. However, this step is not necessary if the VM is running Windows XP.
- Your hypervisor's management tools are installed on the virtual machine. The documentation for your hypervisor should describe how to do this. It should also warn you in the management console if it is not installed.
- If you plan to connect to your Active Directory Domain, you can join the virtual machine to the domain.
- The File and Printer Sharing options in firewall settings are enabled to allow remote agent installation. See the firewall manufacturer's documentation for details. Ensure that your network is identified as a private or domain network.
- If the VM is running Windows XP, in the Advanced Settings section of the View dialog box (navigate to My Computer | Tools | Folder Options | View), disable Use simple file sharing.

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Once you have checked through this list, you can begin to run the import. Your VIAB console should be on the **Generate a base desktop image** tab. Click on **Continue** and a list of importable images will be displayed. Select the image that you want to import, and then provide a name and description.

VIAB 5.2 can now automatically install the Citrix HDX client, plus additional components, which used to be a manual process. You can select the check box and still do this manually if required; but it is recommended to allow VIAB to do this.

Then click on **Import** and input the local images administrator account and password to allow VIAB to make changes to the image.

The console will then update the screen to show you how the import is progressing. During this stage, you will have the ability to edit the image, add software and so on. However, we would recommend that you initially create a clean Windows image in VIAB and then copy this to create images with applications.

You should now be at the prepare image stage. Firstly, select the domain you wish to connect to and add an **organizational unit** (**OU**) if you have one. Then click on **Prepare** and confirm.

You then have the option to test the image you have created. Once selected, you have the options to connect with HDX and RDP. Select **HDX**, and it may also be a good idea to click on the **Peripheral Drives** options to test things such as USB sticks and local printers, where possible. If you have provided your active directory information, you can test with a domain account and check that the active directory policies have been applied. You can also run through the test again with RDP, if required, just to check that it is working correctly and your applications work as expected.

Once you are satisfied with your base Windows image in VIAB, you may decide to copy the image and start to add applications to your copied image. We would always recommend keeping a base Windows image without applications as a fallback. After installing your chosen set of applications in your copied image, go through the testing again and check that the applications are working correctly.

Creating templates from your image

Click on the **Templates** tab, and you should be asked to create desktop templates. Select the edited image with applications and create the first template. Ideally, you will have decided how to configure your templates during the design stage. Give the template a meaningful name, for example, sales or class 1, and then provide a useful description. Then add a meaningful prefix; this will be listed in the desktop console, so that you can see the desktops that have been created from that template. This prefix can be a mixture of letters, numbers, and hyphens. The suffix can also be edited if required, and must be numerical. This provides each desktop with a unique number. Allocate the required memory and CPU to provide the user group with the computer resources that they require for their role. Tick any of the peripheral drives that you would like users to access, and select the color depth, normally True color 32 bit, unless you have a reason to reduce this.

If you are using KMS for Microsoft activation, we would recommend checking the **Reset the activation timer** option for KMS clients. This prevents the grace period of the images expiring before it is deployed.

By clicking on **Next** you move on to the second template configuration page. Here, you can select the maximum number of desktops and the amount you would like to prestart. If you prestart the desktops, they will be immediately available when a user connects, rather than having to wait for the desktop to launch. VIAB will always ensure that the amount of prestarted desktops is as configured; therefore, if a user takes a desktop, VIAB will start a new desktop.

You can then select whether the desktops in this template will be pooled or will be for personal use. If you select the **Personal desktop** option, you can then specify the size of the personal vDisks you wish to allocate. This can be changed at a later stage if required.

You can then decide when you want to refresh the desktops. Refreshing the desktops will provide the users with a clean image, and would aid in increasing the speed and efficiency of the system. Pooled desktops are also refreshed and rejoined to the personal vDisk. You can refresh desktops on logout, schedule for a particular date and time, or do it manually. Many organizations choose to refresh the desktops in the middle of the night, so as to not use server resources when other users are working during the day.

The **Do not reassign desktops "On Hold" to new users** box is checked by default, as most organizations will want users to be able to reconnect to the desktop that they have been using, if it hasn't been refreshed. In an educational environment, it is common to check this due to the high turnover of users.

Assigning templates to users, groups, and IP addresses

By clicking on the **Users** tab, you can assign your templates to users, groups, or IP addresses.

This enables you to determine the best method of assigning the correct template to users.

Assigning templates to a user group

At the user group table, click on **Add**. You can then add a user group and click on **Add** to add a Windows **Active Directory** (**AD**) group to VIAB. As you type, the active directory group name in VIAB should list the groups it can see and you can select the one you want. Then add a description. You can then select the templates you want to assign to the group then click on **Save**. You can repeat this to assign templates to additional groups.

Assigning templates to users

At the **Users** tab, click on **Add**. In the **User ID** box type the user ID for the user you want to assign to a template. If joined to Microsoft AD, VIAB should present a list of IDs once you start typing. You can then select the templates that you want to assign to the user and click on **Save**.

Assigning templates to incoming IP addresses

VIAB includes a very useful feature that enables you to assign a range of IP addresses to a template. This can speed up the process of deploying desktops to users. Addresses can be added as individual addresses (192.168.23.143), prefixes (192.168), or ranges (192.168.10.174-204). Separate entries with new lines or spaces.

From the **Template** list, select the template that you want to assign to the IP address. Then click on **Save** and repeat the process to add more templates to IP addresses.

Testing the connection as a user

Now it's time to log on as a user and test connecting to a virtual desktop. Choose a device and make sure that you have the latest version of the Citrix Receiver (HDX client) installed. You can download this from the Citrix website from the download section. Then start a browser and type in the following:

https://<IPaddress>

A security alert may appear; accept this, and then enter the user ID and password. If you have more than one template, you will see numerous desktops available. Once you click on the desktop, VIAB will pass through your log-in credentials and launch the desktop.

SSL

VIAB includes a self-signed SSL certificate that is not trusted by web browsers and devices. Therefore, when connecting from a browser, you may have to accept a certificate, and this may also cause problems when some thin clients try to connect. Therefore, some organizations decide to install a trusted SSL certificate on their VIAB appliances.

There is documentation on the Citrix website showing how to do this; also, Citrix will be adding a GUI to Version 5.3 that will simplify the addition of an SSL certificate to the VIAB appliance.

Grid IP address

Citrix has added the grid IP address functionality in Version 5.1 to enable high availability. Rather than all the clients pointing at a specific appliance, they now point at a grid IP address. You would add the grid IP address to one of the servers in the grid and any one server will take the responsibility of brokering the connection requests that come to the grid IP. All the VIAB appliances send a heartbeat across the grid, so they know if an appliance goes offline. In the event of the appliance serving the grid IP address going offline, one of the other appliances in the grid will take over the role immediately, enabling users to connect without having to reconfigure the clients.

To configure the grid IP address, perform the following steps:

- 1. Log in to the VIAB web console as an administrator.
- 2. Navigate to Admin | Advanced Properties.
- 3. Type an IP address into the Grid IP Address field.
- 4. Click on **OK** to save.

Kiosk mode

VIAB supports a Kiosk feature that enables you to deploy a standard desktop to device, without requiring users to authenticate. This is ideal for areas such as, libraries, reception areas, conference rooms, and so on. To enable this, you need to create a template and assign it to a range of IP addresses. You would also typically configure the template to refresh on logout. You would also use the fast desktop refresh option that effectively refreshes the desktop from a preactivated snapshot, which is much quicker than creating a desktop from scratch.

Licensing VDI-in-a-Box

When you purchase VIAB, you will receive an e-mail that contains a license code and a link to the Citrix portal. When you get to the landing page, click on **Continue** and on the next page, click on **Confirm**. You can then download the license file.

You can use a Citrix license server for VIAB if you have other Citrix products, or install on the grid. To install on your local grid, connect to one of your VIAB appliances and click on the **Admin** tab. Then click on **Grid maintenance**, and then on **OK**. Click on **Grid and license upgrade** and then on **Choose file**. Once you have found your license file, click on **Open**, and then on **Submit**. You only need to update the license on one appliance, as it propagates to the other appliances in the grid. You can then check if you were successful using the **About** button.

Connecting to the grid

VIAB supports both Citrix HDX and Microsoft RDP. Most organizations will use Citrix HDX, which includes much of the peripheral support and graphics enhancements developed by Citrix to deliver a local-like user experience. All methods of connecting to VIAB require the Citrix Receiver to be installed on the client device. This will ideally be the latest version, as older versions may not be supported. You can download the Citrix Receiver for free from the Citrix website.

Currently VIAB supports three ways of connection to desktops, as discussed in the following sections.

Browser

VIAB supports connections from a browser, with the main browsers being supported. You can simply point the browser to the grid IP address and input your user ID and password. VIAB runs a web interface and displays the desktops that the user can connect to. When you click on the desktop, VIAB passes through the user credentials and connects you to the desktop.

Receiver

The Citrix Receiver can enable connections from an iPad, iPhone, Android tablets, Android phones, and a whole host of mobile devices and thin clients. You can download the Citrix Receiver from the app store of the device.

To connect from the Receiver to VIAB, you would typically configure the following:

http://[VDIManageraddress]/dt/PNAgent/config.xml

You would then input the username, password, and domain.

Java client

Citrix VIAB also supports connections from a Java client. The client needs to be 1.5 or greater to connect. When it connects to VIAB, it automatically updates itself to the latest version.

One advantage that the Java client has is that it automatically attempts to connect with RDP if HDX does not work for some reason.

Citrix Profile Manager

VIAB includes **Citrix Profile Manager**, a free profile management tool. Citrix Profile Manager enables you to ensure that users get the same desktop experience, whether they log on to a fat client or a virtual desktop. Citrix Profile Management consolidates and optimizes user profiles to minimize management and storage requirements. Because it streams the profile down to the user at login, it speeds up the login process.

When you integrate virtual desktops into your environment, it is vital to ensure that users receive a consistent experience every time they log in and the desktop is as they left it with their own personal settings, shortcuts toolbars, templates, wallpapers, and favorites. The most common challenges that impact the user experience and that you have to address when managing user profiles are as follows:

- **Overwriting profiles**: When users work on more than one physical or virtual device, their individual personal settings may be overwritten when they log off.
- Large profiles and logon speeds: Profiles can grow to very large file sizes, resulting in storage and management issues. Typically, during logon, Windows copies the user's roaming profile over the network down to the local machine. The logon time is prolonged by the time it takes to transfer the whole profile over the network. The larger the profiles are, and the more files they contain, the slower the logons will be.

Citrix Profile Management solves these issues by doing the following:

- Ensuring that personal settings, documents, shortcuts, templates, desktop wallpapers, cookies, and favorites always follow the user across different Windows environments on any device.
- Providing the ability to control and reduce the profile size, which improves the logon times.

There is good documentation and even a short video on the Citrix website that shows you how to install the Citrix Profile Management tool on the golden image.

Using NetScaler VPX with VDI-in-a-Box

For organizations that want to deliver VIAB desktops to remote users, **NetScaler Access Gateway VPX** is the ideal solution. NetScaler VPX can run on all the main hypervisors, as well as on off-the-shelf servers. You can buy a platform license for NetScaler VPX, enabling unlimited user connections.

To integrate with NetScaler VPX, you first need to set up a grid IP address for your VIAB grid. You then need to configure the VIAB HDX gateway by performing the following steps:

- 1. Navigate to Admin | Advanced Properties.
- 2. Scroll down to the **Gateway** section.
- 3. Enter the FQDN and port of the NetScaler access gateway in the **External HDX Gateway** field.
- 4. Enter the NetScaler **MIP** or **SNIP** to be used by VIAB in the **Internal HDX Gateway** field.

Integrating Citrix GoToAssist with VDI-in-a-Box

Citrix **GoToAssist** is a monitoring and support tool that can be configured to work with VIAB. This is an excellent solution if you support remote VIAB appliances. You can use the Citrix GoToAssist monitoring dashboards and alerts to remotely monitor and support VIAB appliances and virtual desktops from any location. You can also track key health and performance metrics on the physical and virtual infrastructure. You can configure alerts to provide an early warning system, enabling the IT department to react to problems before users notice any slowdowns.

Using Citrix ShareFile with VIAB

You may have users that connect to VIAB and PCs across different locations that need to access their files. In order to enable this, Citrix has developed **ShareFile**, which is a sharing and sync service where the data is available however and wherever the user connects from.

Depending on how you intend to deploy VIAB, ShareFile could be a useful solution to add into the design if your users will be accessing data from different locations, using different access methods.

Reusing old PCs

When you virtualize your desktop, you may decide to reuse your legacy PCs as display devices. There are a number of ways to do this depending on what you want to achieve. Some of them are discussed in the following sections.

Citrix Desktop Lock

Citrix Desktop Lock locks down the user device, so that users can only access their VIAB virtual desktop and cannot interact with the local desktop. This supports single sign-in as long as the user device is in the same domain as the VIAB grid.

To install Desktop Lock, perform the following steps:

- 1. Log on to the user device with the administrator credentials.
- 2. Download the Citrix Receiver 3.3 Enterprise Edition from the Citrix Receiver download page on the Citrix website.

- 3. Download CitrixDesktopLock.msi from the VIAB download page on the Citrix website.
- 4. Open a command prompt and install the receiver using the following command:

```
CitrixReceiverEnterprise.exe ADDLOCAL="ICA_
Client,SSON,USB,DesktopViewer, Flash,PN_Agent,Vd3d"
SERVER_LOCATION="https://my.vdi-grid" ENABLE_SSON="Yes"
```

In the preceding command, my.vdi-grid is the URL of your VDI-in-a-Box grid.

- 5. Double-click on **CitrixDEsktopLock.msi** and then follow the steps in the wizard.
- 6. When completed, click on Close.
- 7. When promoted, restart the device. If you log in with the domain credentials your VIAB desktop will open automatically, just as if it was your local desktop.

Windows Thin PC

Windows Thin PC is included with the Microsoft software assurance or VDA license required to run a Microsoft desktop operating system as a virtual desktop. It is a locked-down thin version of Windows 7, designed to turn a PC into a thin client.

Windows Thin PC uses write-protection to prevent data from being stored on the local disk and also includes enterprise features such as BitLocker, AppLocker, and DirectAccess, which help you capture savings through improved asset management, policy control, and reduced support costs.

Linux

You may decide that you want the PC to boot up more quickly and install a lighter operating system such as Linux. Many organizations choose to do this and simply add the Citrix Receiver that launches when the desktop boots up, providing a login screen for VIAB. There are third-party products available that can convert a legacy PC into a Linux-based thin client that includes management software such as IGEL UDC and Devon IT VDI Blaster.

Thin clients

There are a number of benefits to using thin clients with VIAB, including the following:

- Lower cost than buying a PC
- Low electricity consumption
- Low heat/noise output
- Small footprint
- Secure

There are a wide range of "Citrix-ready" thin clients available that work well with VIAB. It is important to test your chosen thin clients prior to purchase, as they are not all the same. They can vary in their ability to display graphics and multimedia, and most vendors have a range to meet the organization's needs.

Citrix has a micro site called *Citrix ready Exchange market place,* which includes details of all thin clients that have been verified by Citrix and includes comments and reviews. This is well worth a visit to help you to decide on which thin client is right for you.

Thin clients also run a wide variety of operating systems, and some are called **zero clients** as they can boot from the network. You also need to future-proof your thin client choice as much as possible, as you may require different protocols in the future.

Connecting from mobile devices

VIAB shares the same Citrix Receiver used by Citrix XenApp and XenDesktop and is available for a wide variety of devices. Therefore, VIAB can be used as part of a BYOD strategy to enable users to access the corporate desktop from almost any device.

The Citrix Receiver is free and available for download from the Citrix website. If you decide to add the receiver to a mobile device, it is available as a free app.

The Citrix Receiver is currently available for the following:

- Android 3.3.61
- Blackberry 2.2
- Blackberry Playbook 1.0
- iOS 5.7.2, iPad/iPhone/iPod touch
- Windows Mobile 11.5

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- Java 10.1
- Linux 12.1
- UNIX
- Windows 8
- Windows RT 1.3
- Windows CE 11.2

Supporting Citrix VDI-in-a-Box

VIAB is purchased with a subscription advantage that includes 24/7 support from Citrix. This is an excellent proposition and provides organizations with the needed help to solve any issues in moving ahead. VIAB support actually follows the sun across different support centers, enabling 24/7, and continued support. There is no limit to the number of support calls, or the number of IT staff who can use the contract.

The subscription needs to be purchased when the licenses are bought and kept up-to-date annually. If it is allowed to lapse, you will need to fully backdate it to reinstate the subscription. You can purchase subscriptions upfront for up to five years.

Citrix also offers free support forums. This is a very useful additional tool to the subscription-based support. These support forums bring together VIAB users from all over the world who share problems and fixes. There are also Citrix VIAB developers monitoring the site who can be of assistance.

Summary

This chapter provided details on how to import and configure VIAB; from downloading and installing the hypervisor, to downloading and importing VIAB. It also covered creating the grid and the first Windows image, template creation, and assigning templates to users.

It also included details on grid IP addresses, which is a great feature to enable high availability; and the Kiosk mode, which is ideal for areas where you simply want to publish a standard desktop to generic users which is destroyed after each logon. This could be a library or other public access point.

It also provided details on how VIAB can integrate with other Citrix products, such as NetScaler, ShareFile, GoToAssit, and the free Citrix Profile Management. NetScaler can enable secure remote connections to VIAB, ShareFile can eliminate any file transfer problems that could occur when users connect from local and virtual desktops, GoToAssit is a useful tool if you are planning to support a number of VIAB appliances in different locations, and Profile Management will overcome any issues you may encounter when users connect from local and virtual desktops.

It also covered connecting from multiple types of devices, including repurposing existing PCs, using thin clients, and other consumer type devices.

The chapter concludes with details on subscription support and the free-knowledge forums. Our next chapter looks in more detail at the drivers for VDI, explains typical user cases, and contains a detailed case study.

How Organizations Are Using Citrix VDI-in-a-Box

This chapter provides you with details on the potential benefits that VIAB can bring to your organization. These are largely based around making you more efficient in your job, and giving you better management and support tools, alongside providing users with more flexibility to work from any device and any location.

It then goes onto to discuss some of the business drivers that lead to a VIAB project, including PC refresh, OS upgrades, satellite offices, and so on.

The chapter concludes with details of a case study where the Attwater Group used Citrix VIAB to deliver a corporate desktop to users at a satellite office.

We will cover the following main aspects:

- The benefits of VDI-in-a-Box
- Business drivers and use cases
- Case study the Attwater Group

Benefits of VDI-in-a-Box

This section will focus on the typical benefits that can be achieved when using VIAB.

Windows operating system management

Managing large numbers of dispersed Windows desktop operating systems is not always a simple task, and can take up a lot of the IT department's time. With VIAB, you could potentially be reducing the number of images to manage from hundreds (in a dispersed PC environment) to one. With VIAB, IT administrators only have to manage and update the golden image(s) with Microsoft updates, and so on. VIAB therefore cuts down on administration time and also enables the IT team to test operating system updates prior to rolling them out to users.

Additionally, if you plan to upgrade a Microsoft desktop operating system with VIAB, you simply need to create a new image and configure some templates from it. It should now only take a few hours to upgrade the desktop operating system, compared to a large time consuming project. If you encounter any application issues, and so on with the new OS, you can quickly put revert users back to the previous OS, minimizing disruption and downtime.

Application management and licensing

When it comes to installing, upgrading, and managing applications in a dispersed PC environment, IT departments can find themselves overwhelmed with time-consuming configuration work. VIAB significantly reduces this time as IT only has to install the applications on the golden image(s). Once installed on the image, all the templates connected to that image will be capable of running the application for users.

User management

VIAB can also eliminate trips to the desktop to support user problems. If a desktop requires support, the administrator can simply destroy the desktop and enable the user to log in again, and be presented with a fresh one.

The personal vDisk feature can enable knowledge users to install their own applications and store their profile in their vDisk. This can provide knowledge users with potentially more functionality than they were able to enjoy in a locked down PC environment.

The free Citrix profile management solution will enable users to benefit from the same experience, whether they log onto a local PC or a virtual desktop session.

Reusing older PCs

Many organizations have PCs that are still physically working, but maybe starting to slow down, and are not capable of upgrading to Windows 7 or run additional software packages. By running the desktop in the data center, you can reuse the old PC as a display device and extend the life of it. Organizations can, therefore, increase the return on investment from their original PC purchase. There are numerous ways to lock down PCs as display devices, as described in *Chapter 3*, *Building and Configuring Citrix VDI-in-a-Box*.

Utilizing thin clients

Thin clients present a number of benefits to organizations that could potentially have problems with heat output, power usage, and desk space. Thin clients are typically a much smaller form factor than PCs, and many can fix onto the back of a TFT screen. Thin clients do not have hard disks or processor fans, and so do not have any moving parts, making them quiet and more reliable, which is ideal for a large call center environment, manufacturing site, or in education.

Some buildings have power restrictions and organizations are restricted from adding PCs, and need to use thin clients that typically use around 5-10 watts of power. PCs also generate a lot of heat and noise and environments such as call centers and schools can benefit from reducing this. Many buildings require air conditioning just to reduce the increased temperature generated by PCs.

Finally thin clients have a much higher **mean time between failure** (**MTBF**) than PCs, and in many cases can last twice as long, vastly reducing the desktop refresh budget. This is reflected in the fact that many include a 3 or even 5-year warranty, compared to PCs which typically have chargeable options.

Enabling BYOD

One of the most significant changes in IT happening at the moment is BYOD. Over recent years, there has been a revolution in the choice and form factor of consumer devices, including tablets, such as the Apple iPad or Microsoft Surface and smart phones, largely driven by Apple. Many business computer users are now keen to use their own personal devices at work, and don't want a locked down PC or laptop. BYOD is a significant shift in the way that people work and represents a need for more flexibility and choice. Many studies have found that by offering more flexibility to staff you can attract a higher caliber workforce.

VIAB provides the IT department with a method of delivering a corporate desktop, running in the corporate cloud, securely to a user's personal device. There is likely to be additional requirements around BYOD, including mobile device management and high speed Wi-Fi; but VIAB enables the corporate Windows desktop and business applications to be delivered to any device, across any network and forms a key part of most BYOD projects.

Remote connectivity

Along with BYOD users are demanding the ability to work from any location. This has really been the driving force behind Citrix for the past 20 years. The Citrix HDX protocol is designed to work across low bandwidth, high latency connections meaning that staff can connect to VIAB from not only any device, but any location.

Whether it be a public Wi-Fi network, from home, or even a different country, Citrix Netscaler Access Gateway provides a secure SSL VPN connection that will encrypt all the traffic from the client to the VIAB server.

Business drivers and use cases

Most organizations need a driver to make changes to IT, and this section will describe some of the common drivers and resulting use cases for Citrix VIAB.

PC refresh

As PCs near their end of life as fat clients, organizations often research alternatives to simply refreshing with new PCs. It is likely that since the last PC refresh, the demands of the business have changed to require more flexible working and more efficient IT support.

By implementing VIAB, organizations can reuse the legacy PCs as thin clients and improve management, while having the ability to significantly increase user flexibility.

Desktop OS upgrade

Many organizations decide to rethink their desktop strategy when a desktop OS upgrade is required. Windows XP support is coming to an end in 2014, and new applications can also demand a new desktop OS. Although there are management tools to upgrade and support a dispersed fat client deployment, desktop virtualization is often simple to administer and upgrade.

Satellite office

Supporting users at remote sites with a small IT team based at a different location is problematic with a fat client solution. Travelling to remote sites is time consuming and prevents you from being pro-active.

By centralizing the desktops using VIAB, and either delivering the screen updates across the WAN or supporting the branch VIAB appliances across the WAN, you can streamline support and management by reducing traveling times, delivering higher uptime, and a better quality of service to your users.

Bring-your-own-device (BYOD)

The increasing driver to enable users to connect to a corporate desktop from their own device is moving IT departments towards VDI. BYOD is a complex area, but many organizations will need to deploy a Windows application(s) to users. VIAB allows you to present your locked down corporate desktop to a user's personal device securely, wherever they are located.

This enables you to retain control and security over corporate applications and data, while enabling users to have more flexibility.

Delivering generic desktops

VIAB has a kiosk-mode feature that enables you to deliver standard Windows desktop to an IP address(s) that does a fast refresh on logout, presenting the next users with a clean OS build each time. This is ideal for libraries and other public access points.

Desktop as a Service (DaaS)

VIAB is being used by some cloud providers to deliver hosted desktops and Windows 2008 R2 servers to business clients. Some of these deployments run into the multiple tens of thousands of users.

Case study – The Attwater group

Citrix VDI-in-a-Box with thin clients enables IT to integrate two businesses and benefit from centralized desktop delivery.

About Attwater & Sons Ltd. and Custom Composites Ltd.

Attwater & Sons Ltd. is a world-class manufacturer and supplier of industrial laminates, electrical insulation materials, and machining services. Custom Composites Ltd. manufactures a complimentary range of reinforced composite and carbon fiber tubes. Together the companies supply into diverse industries such as aerospace, military, automotive, sports and leisure, white goods, and power generation.

Attwater & Sons Ltd. history – a life in industrial laminates

Founded in 1868, Attwater & Sons Ltd. are the UK's longest established manufacturer of industrial laminates. Their motto, "Progress through innovation" is core to their continued success and growth. The company work with and deliver quality advice and solutions to some of the world's blue-chip companies in a diverse range of industries. In 2009, Attwater Group acquired two UK tube manufacturers, Custom Composites Ltd. and Shannonvale Plastics, and consolidated all of group's tube making activities at one plant in Rochdale, Lancashire. The official website of Attwater & Sons Ltd. is as follows: http://www.attwater.com.

The challenge

The Attwater Group faced the following two IT challenges:

- Deliver Microsoft Dynamics AX to the remote site
- Simplify the IT infrastructure and desktop support

Attwater and Custom Composites are located at separate sites, linked via ADSL. With core IT infrastructure and support located at the Attwater site, the challenge was to deliver Windows desktops to users at Custom Composites via their LAN-to-LAN VPN to reduce the need to travel to the satellite office for IT support.

There is also a need to provide external developers with access to a Windows desktop running a set of applications. The ability to deliver this centrally was the key to improving management and security.

Both sites are used for manufacturing and are therefore harsh environments for IT equipment. It was, therefore, a goal to employ stateless thin clients, rather than PCs, where possible.

The solution

The initial solution was designed to support 20 users running Windows 7. Each server was sized to support 20 users using the Citrix VIAB 5.2 sizing tool.

CPU Cores	6
Memory	48 GB
Disks	4 x 300 GB 15k SAS RAID 0

The two servers are identical and load balanced together so that in the event of a server failure, the remaining server will continue to operate.

Citrix XenServer, a free Hypervisor was installed on the DELL servers, the NICs were bonded, and VDI-in-a-Box 5.2 was imported. n + 1 redundancy was then set up by configuring the grid.

The next stage was to create a Windows 7 image in XenServer, and import into VDIin-a-Box. The image was then optimized to reduce memory usage and the required applications were added. This golden image then automatically synchronized with the second server in the grid. The template policies were then applied to allow Attwater to deliver different user experiences to their users based upon their AD user / AD Group or subnet.

The result

The Attwater Group and Custom Composites now have a powerful solution that enables them to deliver the following:

- Quick and efficient desktop delivery to remote offices / users
- A system that is simple to support, upgrade, and add new applications to
- A system that is scalable and can be extended quickly and affordably

They are excited about the potential they have to expand the use of VDI-in-a-Box and thin clients within the organization.

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Summary

This chapter has provided you with a high-level summary of the potential benefits that VIAB can bring to your organization, including IT management efficiencies that can help you to do your job, while providing users with more flexibility to do their job.

It then covered some of the business drivers that lead to a VIAB project, including PC refresh, OS upgrades, satellite office, and so on.

The chapter concluded with details of a real-life VIAB case study, in which the Attwater Group used Citrix VIAB to deliver a corporate desktop to users at a satellite office. The next chapter will provide you with information to help you to make the right decisions when planning a proof of concept to test VIAB in your environment.

5 Conducting a Successful Proof of Concept

The planning of the **proof of concept** (POC) is as follows:

- User acceptance testing
- Creating a business case for VDI-in-a-Box
- Expanding from a proof of concept to a live deployment

This chapter provides you with information to help you to make the right decisions when planning a POC to test VIAB in your environment. VIAB does enable you to grab a spare server and build a POC very quickly, but that may not be the best approach. The POC should be planned with a set of objectives outlined prior to the installation.

If you want to expand your VIAB POC to a production system, you need to consider which hypervisor you use for it. You also need to consider the server specification to ensure that you have sufficient resources to run your desired number of users.

User acceptance is the key in any kind of desktop implementation, and it is well worth considering the user benefits of VDI, particularly enabling greater flexibility, to see if you can build that into the POC, which ideally becomes a driver for the adoption of VIAB.

This chapter also includes more information on the benefits of VIAB to assist with the business case. Many organizations have deployed PCs as fat clients for a number of years and a shift towards desktop virtualization can be a first for many organizations. Therefore, a strong business case helps to support the adoption of the technology.
The chapter concludes by reminding you that you can extend the POC out to a production environment by adding a license. Therefore, all of the work you have done on the POC is not lost.

Planning the POC

The proof of concept is an opportunity to test VIAB in your environment, with your applications and your users. Due to its software appliance design, VIAB can be tested on a wide range of hardware including a small server or even a workstation. This means that you can run a POC in house, without having to invest a significant sum in a pilot project.

Prior to moving forward with a POC, it is important to set out your objectives.

Extending the POC

If you plan to keep the work you have done during the POC and copy the configuration into the production environment, you need to ensure that the hypervisor you use during the POC is the same as the hypervisor you will roll out your production system with.

However, if you plan to destroy your POC and start again from scratch, the hypervisor choice is not important. You may choose the hypervisor that will run on your available test hardware, as you are not in a position to purchase new hardware for the POC.

VDI-in-a-Box evaluation license

Citrix offer a free VIAB evaluation license that can be downloaded from the Citrix website. You will need an account on the Citrix website to do this. The website address is http://www.mycitrix.com.

There is also a useful support document that explains how to download the relevant trial software appliance.

The Citrix evaluation license runs for 30 days and extends to 30 users and 3 appliances, to enable you to test the n + 1 high availability features. There are 3 versions of the appliance to download, depending on your choice of hypervisor.

You can add production licenses to your trial at any time, even after the trial has expired and continue to build your production system from your evaluation. Therefore, you do not lose any of the work you have done during the proof of concept.

Choosing the right hardware

It is important to choose the right hardware for your POC, which is largely dependent on your objectives, listed earlier:

- Will the hardware run your chosen hypervisor?
- Can the hardware support your desired number of users?

You may have a small server that you can use for a POC; however, if it can't run your chosen hypervisor, you will need to rebuild the system when you decide to roll it out as a production system. It is not straight-forward to migrate images to different hypervisors. It may also not be a high enough specification to support the number of concurrent users you would like to test.

If you only want to test five task users you would require the following:

- Single CPU
- 16 GB memory
- 1 x SAS disk, or consumer SSDs

If you wanted to test 30 task users, you would require the following:

- Single CPU 6 cores
- 64 GB memory
- 2 x 15k SAS disks

It is important to use the Citrix VIAB sizing tool to check that your chosen hardware is of a sufficient specification to support the number of users you would like to test.

Operating systems to test

VIAB 5.2 can support the following operating systems:

- Windows XP
- Windows 7 (32 bit)
- Windows 7 (64 bit)
- Windows 8
- Windows 2008 R2 server

Most organizations will wish to try a mixture of the available desktop operating systems, including XP, Windows 7, and Windows 8. Citrix VIAB 5.2 now includes full Citrix HDX support for Windows 8.

Typically when organizations have the correct Microsoft licensing for VIAB, they are able to run their choice of Microsoft desktop operating systems. This can create advantages in the following cases:

- You need to deploy Windows XP to some users
- You choose to deploy Windows XP to some users, as it requires fewer server resources than Windows 7
- You are migrating from XP to Windows 7, and are currently testing your applications, and may need to revert back to XP
- You are migrating to Windows 8, and may need to revert back to XP or Windows 7

Therefore the ability to create golden images for XP, Windows 7, and Windows 8 provides you with a powerful tool to test and migrate between desktop operating systems.

You do not necessarily need any Microsoft licenses to trial VDI-in-a-Box, as they offer a 30-day trial. You will receive license warnings, but can continue to test for the 30-day period.

You can read more about Microsoft VDI licensing requirements from the following link:

download.microsoft.com/download/7/8/4/.../VDA_Brochure.pdf.

Testing applications

It is also important to decide which applications you want to test during the POC stage. You can purchase as few as 10 VIAB software licenses for a production role out, so you may not decide to test your entire suite of applications. You may have a tactical strategy in mind for VIAB as an initial first step that only needs to deliver a subset of your applications.

Once you have solved a tactical problem, such as delivering desktops to a satellite office, you will have a much better understanding of what VIAB can do. You will therefore be in a stronger position to extend the testing to enable you to use VIAB in a wider environment.

Testing clients

Citrix VIAB utilizes Citrix HDX, which is a set of enhancements to the ICA protocol. ICA can enable a vast range of devices, such as thin clients, legacy PCs, tablets, and so on, to connect to a Windows desktop. Therefore when deciding what devices you would like to test make sure that you have the devices ready, prior to building your VIAB POC.

If you plan to reuse existing PCs, take time to think about the many options available to help you to re-purpose a PC as a thin client to cut down on management and bootup times.

User acceptance testing

User acceptance testing is one of the most important stages in a POC and it can often be overlooked. It is important to ensure that the VDI desktop delivers at least as good an experience as the one they are used to. For example, login speed, application performance, graphics performance, and so on.

Many of the advantages of VIAB are user advantages such as the following:

- Ability to use any device
- Ability to connect from any location
- Ability to work at any time
- Use thin clients which take up less desk space, generate little heat, and noise

If you can enable some or all of these advantages to users during the test phase, they will understand why you are keen to utilize VDI and you stand a much better chance of getting their support for the project.

Don't forget to keep testing the user experience as the solution is expanded, ensuring that you have scaled the appliances correctly.

If you simply want to improve management and control with VIAB and not enable any user benefits, it can be harder to convince users who may be used to more freedom with their fat client desktop.

What are your criteria for success?

It is important to define your criteria for success prior to running a VIAB proof of concept. You may have a number of ideas for how you could potentially use VIAB in your environment, to solve a number of business challenges. Therefore, you may not need to satisfy every single requirement in order to find useful cases for VIAB.

Deploying VDI should be a looked at as an important business initiative that creates significant benefits in productivity. If VDI does not tick every single box compared to a local PC solution, it should not be discounted immediately. It is very important to look at the bigger picture and assess the wider benefits that VDI can bring such as increased user flexibility and improved management and support.

Creating a business case for VDI-in-a-Box

Many organizations will compare the cost of VDI-in-a-Box deployment to the cost of replacing older PCs with new PCs over 3-5 years. This is a great place to start, but additional criteria need to be taken into account, because VDI offers a number of benefits that can't be realized with a fat client PC refreshment strategy.

This section will provide details on how to build a business case to support your technical proof of concept.

Typical cost associated with VIAB

Compared to most VDI solutions, VIAB is comparatively very easy to cost:

- Server hardware to run the software appliance (remember *n* + 1 for high availability)
- Citrix license for VIAB (concurrent)
- Microsoft license to run VDI desktop

Building a business case

Citrix VIAB will provide nearly all the functionality you can achieve with a PC refresh plus the following additional benefits:

Extending the life of your existing PCs

By running the Windows desktops and applications in the data center, you can convert your old PCs into thin clients in terms of software and extend their useful life. As they physically break, you can then replace them with low cost, low energy thin clients.

Improved desktop uptime

In a VIAB solution, with high availability, you can offer higher availability to users as there should always be a desktop available for them to connect to. If they experience any desktop problems, you can destroy their desktop and create a new one, enabling them to reconnect to a fresh desktop in minutes. In a fat client environment desktop support, issues can be time consuming and may require the desktop to be re-imaged manually.

Improved application distribution

In VIAB you simply need to install and test any new software on the golden image(s) and then you can quickly create new templates and distribute to users. You can also enable users with a personal desktop to install their own software. In a PC environment, it can potentially mean a trip to each PC going through the installation process numerous times, or the use of a management tool which can be complex to set up and maintain. In a VIAB environment, you would not require a PC management solution.

Improved data security

In VIAB all the data remains in the data center, or if copied to the local device using ShareFile is secured. In a fat client environment, it is harder to secure the data — particularly for mobile device users — and important files can be compromised.

Improved virus and malware protection

In the event of a virus attack that can't be cleaned, for example a zero day exploit, you can revert back to a previous image and distribute to users in minutes rather than having to go to each PC to re-image the desktop.

Improved disaster-recovery facilities

The grid architecture of VIAB enables you to build in a level of disaster recovery, whether you simply want a real-time backup of your desktop images to enable a quick re-build or you want to run an identical system from a different location, which would enable all users to connect to an appliance at a different site immediately.

Improved application compliance

With VIAB pooled desktops, you know exactly what software is installed and the number of users who can access it. It is therefore much more straight-forward to ensure compliance.

Increased user productivity

VIAB enables you to securely deliver the corporate desktop to users irrespective of their device and location. VIAB can therefore form part of a BYOD strategy. There are numerous studies showing how organizations that allow BYOD and flexible working, can attract and retain the highest caliber staff.

Expanding the proof of concept

Once you are satisfied with your proof of concept, it is very straight-forward to expand your POC out to a production environment, due to the grid architecture of VIAB.

The first thing to do is add a product license to your VIAB POC. This can be done after the trial license has expired. Once activated, you will need to license your Microsoft desktop licenses, unless you have already done this. This can be achieved with MAK or KMS which are described in more detail in *Chapter 2*, *Designing and Sizing Citrix VDI-in-a-Box*.

Once activated, test your VIAB appliance to check it is working correctly. If so, you can then add more VIAB appliances to your grid. Firstly, install the hypervisor. This must be the same hypervisor used for the POC appliance. Then, import the VIAB virtual appliance. As you start to go through the configuration for your new VIAB appliance, it will ask you to create a grid, or join a grid. You then join the existing grid, and the new appliance will copy across all the images, templates, and user settings from the POC appliance. On a LAN, this would typically take 20-30 minutes, and once completed your new VIAB appliance can accept user connections.

Summary

This chapter has provided information to help you to make the right decisions when testing VIAB. In an interrupt driven world, it is important to set out some key objectives and plan the proof of concept, rather than rushing into it.

User acceptance is the key to the success of any desktop POC and should be thought about carefully. VDI offers a host of benefits to users, so it is imperative to demonstrate these when running the POC, so users understand what VIAB can offer them.

You can start small with VIAB and scale on demand, however, a strong business case is often required, as desktop virtualization is often a new area for many organizations.

It is the key to look at how much money VDI could save, and how much it could make through increased user productivity.

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