Citrix XenApp® 7.5 Desktop Virtualization Solutions

Plan, design, optimize, and implement your XenApp® solution to mobilize your business

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[PACKT] PUBLISHING enterprise professional expertise distilled

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Andy Paul is an accomplished virtualization architect, instructor, and speaker. He has designed and delivered virtualization projects for Fortune 500 companies, public and private health care organizations, and higher education institutions. He has also served as a lead technical trainer, adjunct professor, and guest speaker for multiple organizations.

He is a leading industry consultant. He currently manages multiple delivery teams, oversees project architecture, assists large enterprise customers across various industries, and is a global VDI subject matter expert.

Visit his blog at `www.paultechnologies.com/blog`.

My wife, Mandy; our three beautiful children; and my parents, Steve and Vicki—thank you for always encouraging and supporting me.

To my mentors, Steve Bone and David Lennox, for helping me stretch and reach further than I ever expected. For all of your guidance and friendship over the years, thank you.

About the Reviewers

Markus Darda is the owner of MD Consultancy (Germany) and DaComp GmbH (Switzerland). As a senior Citrix engineer and architect, he works for enterprise customers across Europe to design and implement Citrix (XenApp and XenDesktop) environments. As a Citrix trainer, he teaches all the Citrix products to customers and works for Citrix as a subject matter expert in different courseware and exams.

He has worked for Lanxess, Germany; T-Systems, Germany; Koenen en Co, the Netherlands; and for companies in Switzerland, Sweden, and Norway.

He has worked on different courseware from Citrix.

Ben Piper is a hands-on IT consultant, network and systems engineer, developer, and author specializing in advanced enterprise networking and virtualization technologies, including Cisco, Citrix, Microsoft, RedHat Enterprise Linux, and VMware. He has over 10 years of experience designing and implementing technology and consulting for organizations such as McKesson, the National Science Center, the Department of Veterans Affairs, as well as dozens of hospitals, health care organizations, and small businesses. He has numerous Cisco, Citrix, and Microsoft certifications. He has authored technology content for ExecSense and Corp! Magazine, and his technology advice has been featured on news media outlets, including CNBC, Investor's Business Daily, NASDAQ, and Monster.com. His consulting website, `http://benpiper.com`, provides a variety of free resources for Citrix, Cisco, Linux, VMware, scripting, coding, and more.

Neil Spellings is an independent virtualization and cloud infrastructure consultant who has been working with Citrix products since the early days of WinFrame and MetaFrame, and he was instrumental in the initial deployments of server-based computing technologies for a number of large financial institutions in the UK and Europe.

He is a Citrix Certified Expert - Virtualization and is certified across numerous other Citrix and Microsoft products to give a balanced view of the virtualization marketplace. He is a recognized subject matter expert by Citrix Education and has contributed questions to numerous XenApp 6, 6.5 CCA, CCAA, and CCEE exams, and he has also helped write the recent XenDesktop 7 Design exam.

He is an active member of the Citrix community in the UK. He usually travels around Europe to both present and attend E2E/PubForum events, such as Synergy; he is one of the founding members of the UK Citrix user group and remains on its steering group. He blogs at `http://neil.spellings.net` and frequently shares his opinions on Twitter via `@neilspellings`.

He was awarded the Citrix Technology Professional (CTP) status in 2013 for his contributions to the community.

He is a STEM ambassador and runs a Code Club in a local primary school with the ambition to inspire and encourage children to take up a career in ICT and learn to code.

He lives in Surrey, England with his wife, Ina, and 6-year-old daughter, Zoë.

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Preface

Designing Citrix XenApp 7.5 as the basis for a desktop virtualization solution requires extensive planning. There are numerous options and scenarios to consider. Taking the time to properly plan and then execute is key to any successful deployment.

This book covers how to use Citrix XenApp 7.5 for desktop virtualization solutions. XenApp can be classified as both application virtualization as well as desktop virtualization. When using XenApp, you can provide end user access to select applications or an entire virtual desktop. Providing a virtual desktop with XenApp is also known as using the Hosted Shared Desktop (HSD) model. This means that multiple users can share the same desktop with common resources as opposed to a dedicated desktop.

What this book covers

Chapter 1, *Planning Desktop Virtualization*, provides an overview of desktop virtualization and the associated components. This includes an overview of the building blocks of VDI and determining the right fit for your environment.

Chapter 2, *Defining Your Desktop Virtualization Environment*, focuses on understanding the business requirements and driving factors of your virtual desktop strategy, including creating use cases by understanding your users and applications as well as planning your overall VDI strategy.

Chapter 3, *Designing Your Infrastructure*, explains how to design and scale the core infrastructure to host your XenApp solution. This involves creating high-level reference architectures and planning the virtual, physical, networking, and storage infrastructures.

Chapter 4, *Designing Your Access Layer*, explains how to design the Access layer components, including NetScaler and StoreFront, delving into the design specifics and identifying any constraints.

Chapter 5, *Designing Your Application Delivery Layer*, explains how to design the Application Delivery layer components, including all of the XenApp site design elements such as controllers, session hosts, Delivery Groups, and application publishing models.

Chapter 6, *Designing Your Virtual Image Delivery*, focuses on workload imaging services and delivery. This includes an overview of Provisioning Services and Machine Creation Services as well as best practices and recommendations.

Chapter 7, *Designing Your Supporting Infrastructure Components*, focuses on the remaining supporting components for the XenApp solution, including licensing, database requirements, monitoring services, and print services.

Chapter 8, *Optimizing Your XenApp® Solution*, focuses on the auxiliary components that can be used to further optimize and customize the XenApp environment. This includes profile management, Citrix policies, Active Directory policies, and printing considerations.

Chapter 9, *Implementing Your XenApp® Solution*, covers the final steps to implement a XenApp solution. It focuses on building the desktop and applications for delivery, capacity planning, load testing, user acceptance testing, and production rollout planning.

What you need for this book

This is based on Citrix XenApp 7.5 Platinum Edition and all its associated components, including StoreFront 2.5, License Server 11.11, and Provisioning Services 7.1. We will also take a look at XenServer 6.0.2, Citrix NetScaler 10.1, Microsoft SQL Server 2012, and Microsoft File Services.

In order to recreate the steps in this manual, you will need a minimum of two Windows Server 2008 R2 or Windows Server 2012 systems, preferably more. You will also need the downloadable Citrix XenApp 7.5 media from `www.citrix.com`.

Who this book is for

This book is written for Citrix engineers, Citrix architects, virtualization consultants, and IT project managers. It is assumed that the reader has some prior experience with Citrix XenApp and related technologies or with desktop virtualization. However, prior experience is not required to understand the main concepts and flow of the material presented.

This book attempts to balance technical detail and business logic. Each topic is written using an easy-to-follow guide based on real-world experience and explains the reasoning behind the recommended design decisions.

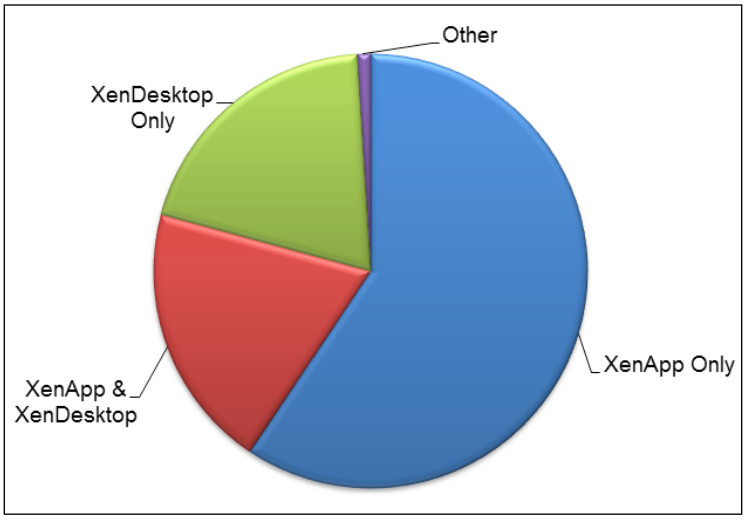
Introduction to the XenApp® 7.5 platform

Before we delve too deep into desktop virtualization solutions, you need to first understand more about Citrix XenApp. Citrix XenApp was previously known as Citrix Presentation Server. Prior to that, it was also known as Citrix MetaFrame Server and Citrix WinFrame Server. You may hear some of these other terms or see them mentioned in other articles or legacy documentation. With the introduction of Citrix XenDesktop 7, XenApp and XenDesktop were merged into a common code base. The material presented in this book for XenApp 7.5 applies to XenDesktop 7.5 environments as well.

Citrix XenApp operates on top of Microsoft Remote Desktop Services, also known as Terminal Services or Remote Desktop Session Host. XenApp contains its own management suite (called Studio) as well as its own transportation protocol (ICA, short for Independent Computing Architecture). The combination of management and streamlined protocol has allowed Citrix to maintain status as the industry leader in application and desktop virtualization. Combining this with other products of Citrix allows enterprises to create secure and scalable virtualization solutions.

In its most simplistic form, Citrix virtualization is about enabling users to use their applications from any device anywhere. If a user is not able to use his/her applications effectively, then there is little point to virtualization. Even in a traditional desktop environment, Citrix can be leveraged to deliver applications to users in a secure and scalable fashion.

In most environments, XenApp can deliver the entire desktop and application set. In other environments, you may see a mix of XenApp and XenDesktop, as shown in the following figure:



The distribution of XenApp and XenDesktop in VDI consulting engagements

Benefits of using Citrix XenApp®

The key objective in all of this is to allow users to remotely interact with applications. If a user is not able to use their application effectively, then there is no reason for businesses to invest in virtualization. Using remote applications with Citrix XenApp offers numerous benefits; they are outlined in the following table.

The following benefits illustrate why organizations, large and small, see the value of using Citrix XenApp for their virtualization solution. There may be additional benefits for your organization as well, such as:

Benefit	Description
Accessibility	Using the latest Citrix Receiver allows users to access their Citrix XenApp applications and desktops from virtually any device and any location in the world.
Compliance	Many industries, including health care and finance, have strict regulations governing computer systems. These regulations could include software applications, versioning control, and data security. By using XenApp, you centrally control the applications and the data.

Consistency	Since the applications and data are managed within the data center, users have a common and consistent experience regardless of their client device. A user who is accessing applications from home has the same experience as those accessing their applications from their office PC.
Convenience	Administrators can manage applications from a single console. Users can access all applications from a single portal. This provides convenience and ease of use for everyone.
Management	The central management of applications and desktops and their maintenance allows ease of administration.
Monitoring	By keeping all operations in the data center, you can effectively monitor the XenApp environment to ensure optimal performance. This also allows the effective auditing of users and application access, where required.
Portability	Citrix XenApp enables a flexible workforce, including BYOD users, work-at-home users, office employees, and road warriors.
Reliability	The ICA protocol, used by Citrix XenApp, is built to create a reliable and stable remote connection.
Scalability	Citrix XenApp can rapidly scale both up and out to support a growing number of applications or users, or both.
Security	Keeping all data and data operations within the data center ensures that there is no sensitive information leaving the secure zone. Since none of the data resides on the client device, there is limited risk of data loss.
Stability	Citrix XenApp can be built on robust hardware configured for fault tolerance and High Availability. This ensures a level of stability and minimal downtime, thus ensuring a production environment.

Citrix XenApp® 7.5 feature comparison

This book is written about XenApp 7.5 Platinum Edition. This feature set was chosen because it is the most current XenApp release at the time of writing, as well as the most feature rich one. The following table shows the feature comparison between the different XenApp licensing levels. Note that while Platinum Edition is the most expensive, it is also the most common in enterprise environments. Also, since XenApp 7.5 and XenDesktop 7.5 use the same code base, many of the features overlap.

	Advanced	**Enterprise**	**Platinum**
Application access			
Enterprise App Store	X	X	X
Microsoft App-V Integration	X	X	X
Offline applications		X	X
Server-hosted applications	X	X	X
Session virtualization	X	X	X
VM-hosted applications		X	X
Supported devices			
Browser-based access	X	X	X
Linux	X	X	X
Mac	X	X	X
Smartphone	X	X	X
Tablet	X	X	X
Thin client	X	X	X
Windows	X	X	X
User experience			
HDX 3D Pro		X	X
HDX mobile	X	X	X
HDX seamless local applications			X
HDX user experience optimization	X	X	X
HDX vGPU sharing		X	X
Unified communications optimization		X	X
WAN optimization	X	X	X
Image management			
Amazon AWS integration		X	X
Delivery Group assignment	X	X	X
Hybrid cloud provisioning		X	X
Machine Creation Services	X	X	X
Profile Management	X	X	X
Provisioning Services		Limited	X

	Advanced	Enterprise	Platinum
Scalability			
Centralized management	X	X	X
Enterprise scalability	X	X	X
High Availability and failover	X	X	X
Hypervisor agnostic	X	X	X
SCCM integration		X	X
Security			
Two-factor authentication support	X	X	X
Centrally secured applications	X	X	X
Centrally secured desktops	X	X	X
Encrypted application access	X	X	X
File and data containment	X	X	X
NetScaler Gateway universal license			X
SmartAccess			X
SSL VPN			X
Manageability			
AppDNA			X
Configuration logging		X	X
Delegated administration		X	X
Enhanced monitoring		X	X
Historical performance trending			X
Simple to deploy	X	X	X
User experience network analysis			X

For a comparison of XenApp features across different product versions as well as licensing levels, visit `http://www.citrix.com/go/products/xendesktop/feature-matrix.html`.

Comparing Citrix XenApp® 7.5 with previous versions

The following table compares terms and concepts previously used in earlier versions of XenApp with the equivalent or replacement terms and concepts in XenApp 7.5:

Previous XenApp versions	**New XenApp 7.5 nomenclature**
Independent Management Architecture (IMA)	FlexCast Management Architecture (FMA)
Farm	Delivery Site
Worker Group	Session Machine Catalog
	Delivery Group
Worker	Virtual Delivery Agent (VDA)
	Server OS machine
	Desktop OS machine
Zone and data collector	Delivery Controller
Delivery Services Console	Citrix Studio and Citrix Director
Publishing applications	Delivering applications
Data store	Database
Load evaluator	Load management policy
Administrator	Delegated Administrator
	Role
	Scope

What's new in Citrix XenApp® 7.5

The following features are new in XenApp 7.5 / XenDesktop 7.5:

- XenApp built on FlexCast management
- A single management console (Citrix Studio)
- A monitoring and troubleshooting console (Citrix Director) with integrated EdgeSight features
- Cloud deployments
- Full AppDNA support

- StoreFront 2.5
- Extended support for Web Interface 5.4
- Remote power control for physical PCs

The following features are added as part of XenDesktop 7.1:

- GPU integration
- vGPU sharing
- Windows Server 2012 R2 and Windows 8.1 support

The following features are added as part of XenDesktop 7:

- A machine catalog for server OS and desktop OS machines
- A machine catalog for applications
- Windows Server 2012 and Windows 8 support
- Desktop composition redirection
- Windows Media client-side content fetching
- Multicast support
- Real-time multimedia transcoding
- User Datagram Protocol (UDP) audio for server OS machines
- Webcam video compression
- HDX 3D Pro
- Server-rendered rich graphics and video
- Improved Flash Redirection
- Streamlined installer
- Profile management
- Configuration logging
- Desktop Director with EdgeSight features
- Delegated administration
- Personal vDisk
- Machine Creation Services (MCS) support for Microsoft Key Management System (KMS) activation
- Multitouch support
- Remote PC access
- Universal Print Server

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, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows: "This was accomplished by placing the application in a folder called `VDIOnly` and hiding this folder."

A block of code is set as follows:

```
select UserID, StartDate, MachineID from [MonitorData].[Session]
where userID = 2
order by StartDate DESC
```

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

```
# cp /usr/src/asterisk-addons/configs/cdr_mysql.conf.sample
     /etc/asterisk/cdr_mysql.conf
```

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: "Click on **Retrieve Attributes to verify**."

Warnings or important notes appear in a box like this.

Tips and tricks appear like this.

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1
Planning Desktop Virtualization

Planning for desktop virtualization requires understanding the building blocks of Virtual Desktop Infrastructure, commonly referred to as VDI. This entails not only understanding the technical components of VDI, but also the business drivers and how VDI fits into your overall environment. Mapping your business objectives with the proper technology should be the ultimate goal of any VDI project.

In this chapter, you will learn about the following:

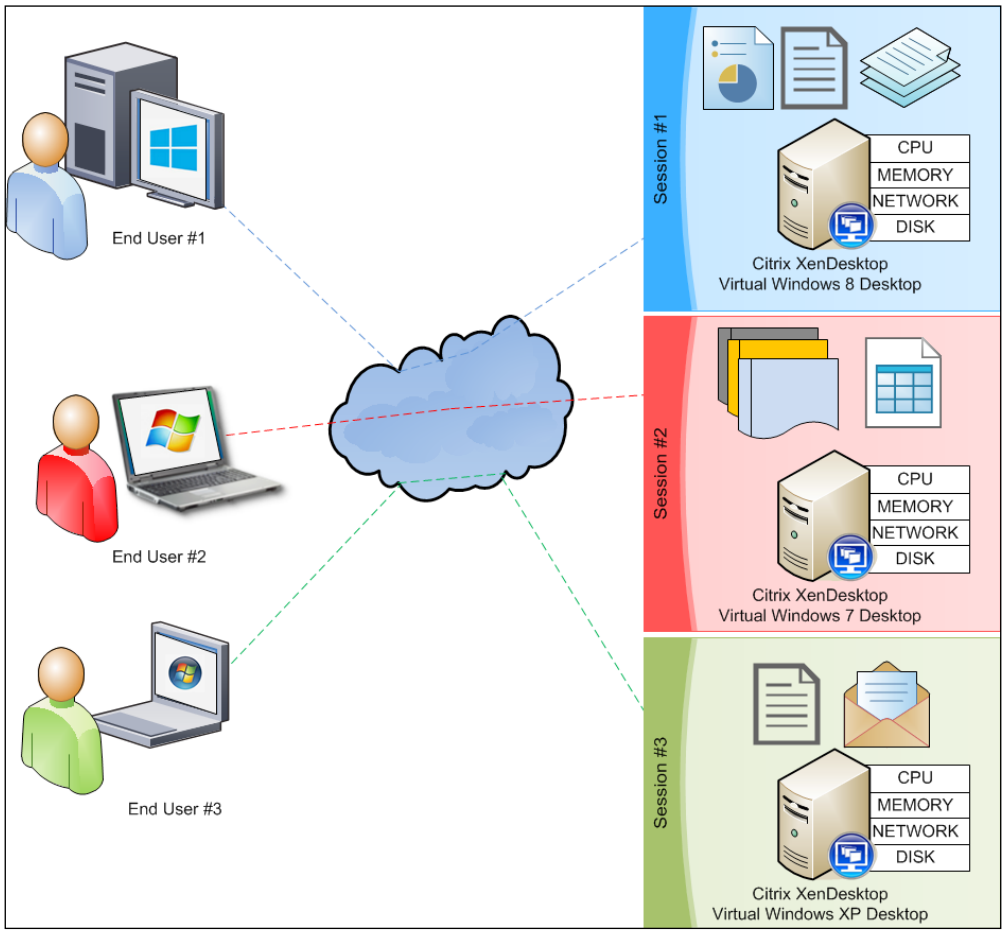
- The building blocks of VDI
- VDI layers
- How to determine the right fit for your environment
- The road map to success
- Managing your project

The building blocks of VDI

The first step in understanding **Virtual Desktop Infrastructure** (**VDI**) is to identify what VDI means to your environment. VDI is an all-encompassing term for most virtual infrastructure projects. For this book, we will use the definitions cited in the following sections for clarity.

Hosted Virtual Desktop (HVD)

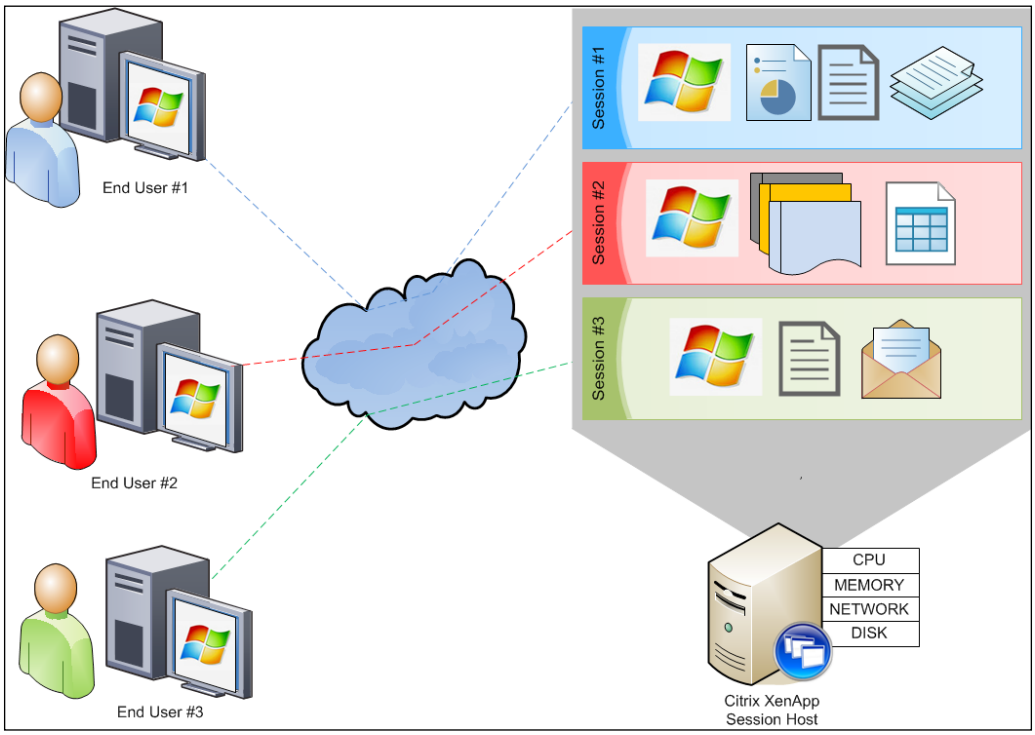
Hosted Virtual Desktop is a machine running a single-user operating system such as Windows 7 or Windows 8, sometimes called a **desktop OS**, which is hosted on a virtual platform within the data center. Users remotely access a desktop that may or may not be dedicated but runs with isolated resources. This is typically a Citrix XenDesktop virtual desktop, as shown in the following figure:



Hosted Virtual Desktop model; each user has dedicated resources

Hosted Shared Desktop (HSD)

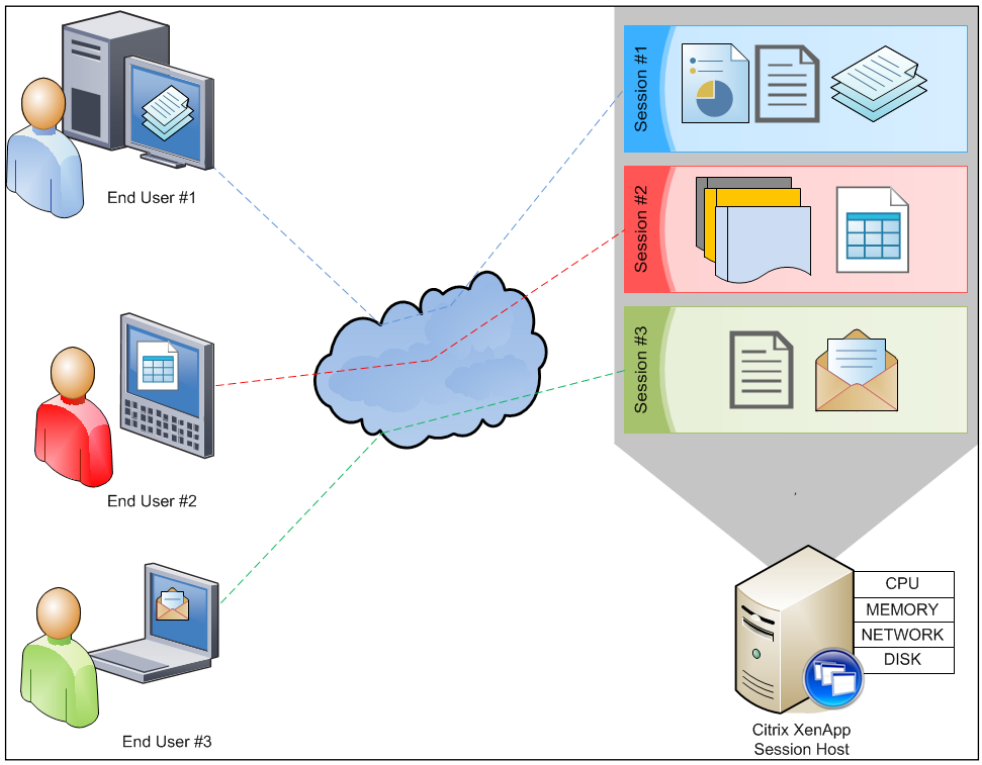
Hosted Shared Desktop is a machine running a multiuser operating system such as Windows 2008 Server or Windows 2012 Server, sometimes called a **server OS**, possibly hosted on a virtual platform within the data center. Users remotely access a desktop that may be using shared resources among multiple users. This will historically be a Citrix XenApp published desktop, as demonstrated in the following figure:



Hosted Shared Desktop model; each user shares the desktop server resources

Session-based Computing (SBC)

With Session-based Computing, users remotely access applications or other resources on a server running in the data center. These are typically client/server applications. This server may or may not be virtualized. This is a multiuser environment, but the users do not access the underlying operating system directly. This will typically be a Citrix XenApp hosted application, as shown in the following figure:



Session-based Computing model; each user accesses applications remotely, but shares resources

Application virtualization

In application virtualization, applications are centrally managed and distributed, but they are locally executed. This may be in conjunction with, or separate from, the other options mentioned previously. Application virtualization typically involves application isolation, allowing the applications to operate independently of any other software. This will be an example of Citrix XenApp offline applications as well as Citrix profiled applications, Microsoft App-V application packages, and VMware ThinApp solutions. Have a look at the following figure: