Citrix XenDesktop and Amazon Web Services White Paper

Flexing to the Cloud with Citrix XenDesktop and Amazon Web Services



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Introduction

The hybrid cloud explained

With the recent surge in interest around cloud service technologies, customers are exploring what a cloud-based strategy can provide them. With a typical public cloud infrastructure platform, the service provider only lays the foundation: an operating system, server management platform, and supporting services. The customer then installs applications and/or develops the necessary user workspaces.

With the virtualization movement and subsequent cloud-era dramatically changing the way IT protects and delivers applications, desktops, and data to an everincreasing mobile workforce, increased adoption of virtualization technologies and cloud-based solution architectures have brought about a myriad of benefits. With these benefits however have come additional layers of complexity for each new variation in the provisioning and delivery process.

Advancements in virtualization technology have added layers of complexity as both physical servers, virtual servers and (as both physical server and virtual servers along with associated storage associated storage now need to be configured, managed and monitored independently. To reap the larger benefits, the once simple service delivery workflow has been expanded to account for the additional layers, including physical or virtual, and locations, including private, public or hybrid cloud, that are now integrated within solution architecture. Ideally hybrid cloud solution should be a seamless extension of the data center, consisting of desktop and application resources from private and public clouds, hosted on or off-premise.

Private cloud versus public cloud

The integrated platform for provisioning hybrid clouds using XenDesktop and XenApp enables IT admins to deliver a complete range of apps and desktops, whether in the private cloud or in the public cloud, while consolidating management, monitoring and maintenance tasks. The private cloud is the collection of on-premise infrastructure, desktops, applications and data delivered on demand by enterprise IT. Private clouds can also be hosted off-premise. In this case, a service provider offers a portion of its public infrastructure for exclusive use by a single customer, also known as a tenant.

The public cloud is the collection of off-premise, multi-tenant infrastructure, storage and computing resources, as well as SaaS applications and data, which are delivered on demand by external cloud service providers. Public clouds allow multiple customers, or tenants, to share the underlying resources with each paying only for the resources it consumes.

Benefits of a hybrid cloud for applications and desktops

Citrix is changing the role of IT as enterprises transition into the cloud-era through products and solutions that transform any Windows application or desktop into a cloud service delivered across any network, to any device. Citrix XenDesktop 7.5 and XenApp 7.5 provide cloud-ready application and desktop service delivery from any type of private, public and hybrid cloud enabling enterprises to couple cloud

computing with application and desktop virtualization to realize the combined resource optimization, infrastructure agility and economic benefits from a single platform. Citrix XenDesktop and XenApp are the industry's only cloud-ready software platforms to deliver mobile, secure access to a complete collection of app and desktop virtualization solutions. Citrix provides a hybrid cloud solutions that gives organizations the freedom to deploy applications when and where they make the most sense to meet an organization's security, performance, and availability requirements.

The Citrix cloud continuum

As we have seen, many enterprises are increasingly turning to hybrid clouds to combine the benefits of building private and public clouds as well as leveraging existing IT infrastructure to cut costs, maximize value and modernize the way IT services are delivered. The Citrix enterprise product portfolio is built such that no matter what stage a customer is at during this transformation to leverage cloud, Citrix has the products, technologies and reach to make switching to the cloud easier as the industry's only integrated end-to-end cloud platform. Furthermore, due to Citrix's high level of product integration, at no point in the process does a customer waste resources on point-based or stop-gap solutions.



Hybrid cloud use cases

Commodity applications and desktops

Generally the best practice when it comes to hosting applications is to keep the application logic next to the data. While this is accurate with respect to mission critical or line of business applications; sometimes there are general use or commodity applications than can function equally well no matter where their logic resides. Often the moving of these applications to the cloud brings along with it various cost savings as well as business agility benefits through the rapid provisioning and de-provisioning of applications.

Q&A test/development

Ramping up resources for application testing and development can be a costly endeavor. Providing cloud access to testers allows for the rapid provisioning of necessary resources for the testing phase, and then the destruction of them upon completion of the project. The ability to rapidly scale up an environment and only pay for the resources that are being used can be a rather large savings in not only time, but also on-going administrative and support overhead.

Enterprise IT/Outsourced data center

Many companies are exploring the benefits of outsourcing data center functionality. These include the ability to avoid the heavy costs and requirements involved in building an entirely new data center. A cost-effective option would be one that allows for a seamless increase capacity with linear cost curve. The on-demand capacity and dynamic enterprise scalability of a Citrix cloud solution would meet these requirements perfectly.

Business partner and/or temporary workforce

Companies require rapid deployments of corporate resources to contract and other "non-employees". The use of a hybrid model allows for the flexibility of supplying the contract working a desktop in the cloud that meets company standards, while securely accessing applications located in the company's datacenter. Upon completion of the contract, a company can simply terminate the instance that resides in the cloud as to no incur any additional cost.

Application disaster recovery and redundancy

Increasingly more companies are discovering and starting to leverage cloud services for disaster recovery. A cloud-based service model is an attractive alternative for companies that may be strapped for IT resources; most common these days in SMB's. Cloud service's usage-based costing model is often a great fit for disaster recovery because the expensive secondary infrastructure spends most of its time sitting idle while on-premise resources are used in the everyday course of business. Having an organizations disaster recovery site(s) in the cloud reduces the need for data center space, IT infrastructure and IT resources, which can lead to significant, cost reductions. These reductions often enable small and medium sized companies to deploy disaster recovery solutions that were usually only found in large enterprise.

Virtual workspace considerations Profile and user data

In general it is a Citrix delivery model best practice to separate the applications from the desktops. In doing so, users are provided a seamless workspace where applications appear to be locally installed within the client operating system or virtual desktop and can communicate with one another natively. Additionally since applications are not physically installed into the golden image, image sizes are kept to a minimum which increases performance and helps control storage costs. In a typical hybrid cloud VDI deployment, where the shared virtual desktops are hosted in the cloud and the applications are hosted on-premise, there are no user data or profile implications as no architectural changes to the application hosting are required. Cloud-based desktop users will leverage a mandatory profile, enforced by Active Directory OU membership and the user's roaming profile will be accessible through the application session.

Domain authentication

When designing a Hybrid cloud solution for desktops and/or applications an important consideration will be your domain authentication topology. Active Directory domain controllers can run within an AWS cloud environment and be replicated from existing on-premise domain controllers using the CloudBridge Connector. This allows the servers to authenticate to local domain controllers, but still authenticate to corporate user identities and credentials. Often replicating these services in the cloud provides for better authentication performance. It is recommend to replicate domain controllers across Availability Zones (as with other resources) to provide high availability.

If security or compliance issues prohibit placing a read/write domain controller off premise, it is also possible to directly connect to existing on-premise domain controllers through the CloudBridge Connector. Some considerations with this approach however include making sure the cloud-based server resources are properly joined to the domain and can complete successful DNS name resolution with the domain. Additionally, the organization's physical connection to the Internet should be of adequate size and quality to support all possible domain authentication traffic along with all ICA traffic from user sessions. Refer to the Resources section for more information on sizing of links for ICA traffic as well details on configuring a read-only domain controller.

How does Citrix enable a flexible hybrid cloud architecture? XenDesktop 7.5 / XenApp 7.5

Citrix XenDesktop is a desktop virtualization and VDI solution that delivers a complete Windows desktop experience as an on-demand service to any user, anywhere. Whether users are task workers, knowledge workers, or mobile workers, XenDesktop can quickly and securely deliver individual applications or complete desktops while providing a high-definition user experience. The recently released XenDesktop 7.5 simplifies virtual desktop delivery and Windows app delivery to an increasingly mobile workforce by leveraging the elasticity of hybrid clouds and the security of mobile device management. Only XenDesktop can provision application or desktop workloads to private or public cloud infrastructure alongside a traditional virtual infrastructure deployment. Support through Amazon Web Services or any Citrix cloud platform-based public cloud or a private cloud infrastructure. Support for Windows Azure will be available in the near future.

Citrix XenDesktop and XenApp have been redesigned as cloud ready solutions for delivering both applications and desktops on any type of cloud infrastructure by integrating with any virtual infrastructure technology, storage infrastructure and complex network topologies to deliver a single, unified platform. XenDesktop and XenApp now enable enterprise IT to build a common service delivery architecture for all Windows apps and desktops leveraging common policies and tools that simplify deployment and management. By delivering Windows apps and desktops as a cloud-like service, XenDesktop and XenApp can handle multiple versions and instances of both Windows Server and desktop operating systems from a single platform. XenDesktop and XenApp are built to leverage any virtual infrastructure or cloud management platform.

Whether using the included Citrix XenServer, leveraging the performance and rising popularity of Microsoft Hyper-V, or building on an existing VMware vSphere infrastructure, XenDesktop is built to be hypervisor, storage and network agnostic. Citrix XenDesktop and XenApp are the first solutions to be fully integrated for cloud solutions. Virtual apps and desktops can be deployed on popular cloud platforms including Apache CloudStack based Citrix CloudPlatform or Amazon Web Services (AWS) making it easier than ever to dynamically expand the infrastructure footprint. For details refer to the XenDesktop and XenApp administration guide in the Resources section.

StoreFront

This increase in mobile activity has led to the concept of the app store, providing users with one centralized access point for all the applications available for a particular platform delivered leveraging a self-service model. App stores are popular with users because applications are easy to access and users can select applications to meet their individual needs, not to mention synchronize their applications across multiple devices. The user experience is both personal and consistent. With Citrix StoreFront you can bring that same on-demand app store experience to your enterprise. StoreFront enables you to create universal enterprise app stores to facilitate your users' mobile workstyles while giving you centralized control. Like consumer app stores, StoreFront stores provide users with on-demand, self-service access to their business resources. However, StoreFront expands the experience across all your users' devices, including their mobile devices. Users get a single, consistent point of access to their desktops and applications from all their devices, enabling them to work wherever and whenever they want. For details refer to the StoreFront administration guide in the Resources section.

NetScaler VPX

The Citrix NetScaler product line optimizes delivery of applications over the Internet and private networks, combining application-level security, optimization, and traffic management into a single, integrated appliance. You install a NetScaler appliance in your server room and route all connections to your managed servers through it. The NetScaler features that you enable and the policies you set are then applied to incoming and outgoing traffic. For details refer to the Netscaler administration guide in the Resources section.

NetScaler CloudBridge connector

The CloudBridge connector is a feature of the Citrix NetScaler and Citrix CloudBridge appliances that seamlessly connects enterprise datacenters to external clouds and hosting environments. This secure connectivity is accomplished through a secure GRE tunnel and makes the cloud a secure seamless extension of your enterprise network.



CloudBridge VPX/MPX

Citrix CloudBridge appliances optimize your WAN links, giving your users maximum responsiveness and throughput at any distance. A CloudBridge appliance is easy to deploy, because it works transparently. You do not have to change your applications, servers, clients, or network infrastructure. CloudBridge delivers industry leading advanced TCP protocol acceleration, which reduces delays on congested or high-latency links. Additionally, protocol acceleration for Windows network file systems (CIFS), XenApp (ICA and CGP, including the new multi-session ICA standard), Microsoft Outlook (MAPI), and SSL. On top of this, CloudBridge can provide bandwidth saving multi-session compression with compression ratios of up to 10,000:1. The CloudBridge is an optional component of the Citrix flex cloud solution and its integration will be covered in detail in a subsequent whitepaper.

Citrix Cloud formation templates

The AWS EC2 cloud not only provides the on-demand resources (compute, database, network etc.) you need to deploy a XenApp 7.5 solution but also provides a way to script the provisioning and configuration steps so you can deploy it easily. AWS CloudFormation enables you to create and provision AWS infrastructure deployments predictably and repeatedly. It helps you deploy AWS services such as Amazon Elastic Compute Cloud (EC2), Amazon Elastic Block Store (EBS), and Auto Scaling groups to build reliable, scalable, and cost-efficient applications. In addition, we've provided some basic Windows PowerShell scripts for a more detailed configuration of the Windows-based Amazon EC2 instances.

These Windows PowerShell scripts provide limited functionality and are not meant to represent a final solution. The scripts are built from samples freely available on the usual Windows PowerShell community sites and are meant to show how you can use AWS CloudFormation and Windows PowerShell to reach deep into your instances at provisioning time and perform the necessary configuration steps. This CloudFormation template constructs a VPC, with a NetScaler Gateway, temporary Domain Controller, Bastion Host, Delivery Controller and a VDA Master Image. When deploying a production environment, you will want to replace the scripts with your own. To download the template, refer to the Resources section in this paper.

Solution overview

Meeting business demand and users needs

Public clouds provide seemingly unlimited scale, making them appropriate for situations with unpredictable demand. Users demand a seamless, reliable, high performance experience from the desktop to the data center to the cloud. Citrix meets these demands by powering mobile workstyles through solutions that address people, data and apps while powering public and private cloud services through solutions for unifying, bridging and building cloud environments. The cornerstone of the Citrix solution set is the XenDesktop delivery platform, featuring the FlexCast Architecture. XenDesktop meets these demands and provides business agility by separating the applications from the desktop. Refer to the Resources section for more details on the benefits of the Flexcast architecture.



Extending resources to the cloud

Extending application and desktop resources, otherwise known as flexing to the cloud, involves the deployment and integration of a parallel XenDesktop site located in the cloud. This parallel site provides customers a high-performance environment that can grow and change in an on-demand fashion based on current user and business needs. Desktops, applications or both can be quickly provisioned and

deployed via this cloud environment and then leveraged transparently through existing access methods that users are familiar with. Citrix licensing, management and authentication can be integrated with existing on-premise tools, while seamless, secure connectivity between the cloud and on-premise resources is provided via the CloudBridge Connector.



Solution deep dive Introduction

The Citrix XenDesktop flex cloud solution consists of a parallel XenDesktop site positioned inside a VPC (virtual private cloud) in AWS (Amazon Web Services). Server-based VDI desktops will be hosted from the cloud with the option of providing applications as well. This new site shares domain authentication, licensing and Citrix StoreFront access with an existing on-premise corporate site. Secure connectivity between the AWS site and on-premise site is provided by the Citrix CloudBridge connector running on a pair of NetScaler VPX's. The following detailed steps outline the creation and configuration of the environment below and are intended primarily for demonstrations or proofs-of-concept environments.



The customer cloud environment - Amazon Web Services

Log into the AWS Management Console. amazon webservices Amazon Web Services Sign In Under EC2, Create Key Pair. Interior Interior Sort Res Reserved AMS Durde T Values Values Dequivo Socially O Earlic Pr Pacenet Load Datavore Rey Pairs Give the Key Pair a friendly name. Create Key Pair Click Yes. Key pair name: XD75AWSProduction Save private key created in a safe location. Yes Cancel Open Save Cancel Create Cloud Formation. 🎁 Ser azon Web S Click Create Stack. Select a stack above Enter a friendly name for the newly **i** Temp Paran Option Revie created stack.

Upload the cloud formation template and run the script.

ate eters	Create A	New Sta	ack		
15 W	AWS CloudFon requirements in	nation gives a template.	you an easier way to create a collection of related A To create a stack, fill in the name for your stack and	WS resources (a stack select a template.) by describing yo
	Stack	_			
		Name	1		
	Template		b.		
		Source	O Use sample template		
			~		
			Upload template file Browse		

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Specify any custom/key parameters specific to the VPC or on-premise environment;

- Availability Zone
- User Access Key
- Key Pair Name
- Secret Access Key
- Custom IP address requirements
- XenDesktop ISO location
- Etc...

Note: Changing the Domain name for the auto-created server instances here is not required as it will be done in a later step when joining the on-premise corporate domain.

Click Next Step and run the creation script.

Review Template details and Parameters ensuring the accuracy of the Availability Zone, Key Pair names, and any other parameters that were modified from their defaults in the previous step.

Click Create.

Options			
Review	below are the parameters a needed below.	ssociated with your CloudFormation	template. You may review and proceed with the default parameters or make customizations a
	Parameters		
	ADInstanceType	nå nediun	Amagon ECQ instance type for the Active Directory Instance
	ADPrivatelp	12.0.1.5	Final private iP for the first Active Directory server
	AZ	us-west-2a	Name of Availability Zone that will cantain public & private submits - Select a valid Zone for your region
	BastioninstanceType	evt small	Amazon EC2 instance type for the Bastion Instance
	OMZCIOR	12.0.0.024	CDR Book for the Public Subnet
	DomainAdminPasswor d	CR04(\$123	Password for the dumain admin user. Must be at least 8 sharachers sortiaring letters, numbers and symbol
	DomainAdminUser	XenAdmin	
		User name for the account that will be an	died as Domain-Administrator. This is separate from the default "Administrator" account
	Domain0NSName	sencloud net	Fully qualified domain name (FQ2H) to be used for the DHCP scape e.g. sendout com
	DomainLD0FFormat	DC-sendout,DC-net	1.Diff domain (uplo 30 characters) for orealing users in the Active Domain Tree
	Domain/NetSi/OSName	sencioud	NetBOS name of the domain (upto 15 characters) for users of earlier versions of Windows e.g. CTRCLOU
	IAMOserAccessRey	ANDAJWIOCG4GKXV73W2Q	UME User Assess Key used to smalle and surfigure the narious induces
	KeyPairName	XenCloud	Publicprivate key pairs allow you're security connect to your instance after it launches
	NA Tinstance Type	ert small	Amazon EC2 indiance type for the NAT indiances
	NSCIOL/FormationURL	https://s3.amazonaws.com/cf.Xer	The public URL for the NetScaler VPX CloudFormation v4.1 Template
	NSNSP	12.0.1.100 Fixed private IP for the NetScaler NIC or	annected to the Private Subnet, should be within the CIDR of the private subnet
	NSINP	12.0.0.175 Fixed public IP for the NetScaler NIC co	needed to the Publich Subnet, should be within the CIDII of the public subnet
	PrivateCIDR	12.0.1.0/24	COR (truck for Private Bullevil)
	RestoreModePassword	Citiox@123 Pessword for a separate Administrator a numbers and symbols	court when the domain controller is in:Testure Mode, Must be at least 5 characters containing letters,
	SecretAccessKey		MMI User Secret Access Key to be used
	ServerNetBIOSName	0001	Hellich name of the AD flerver (upto 15 characters)
	WOOLDR	12.0.0/16	CORE Block for the WPC
	VPCName	XenDesktop 7.5 VPC	The name of the Virtual Private Coud
	xDTDDCinstanceType	ind targe	Amazon EC2 Instance type for the XenDecistop 7.5 Decistop Delivery Controller Instances
	X07/SOLecation	https://s3.amazonaws.com/cf.Xer	
		An accessible source location of a XerD	lesitep 7.160, e.g. on 53 Hige.in3 amazonawa.con/dXen0esitep/50Xen0esitep/187M.ioo
	XDAdminPassword XDAdminUser	x0FamAdmin	Presente to an energy even une, even or a well if Californi Californi Millin, Nationi and United
		User same for the XenZeoktop Admin A dbcreatur rale.	count. The Account is a Domain User and will also be added later to the SOL CR as a member of the
	Canabilities		
	Capacitors		
		The following resources the temptate will create	rce(s) require capabilities: [AWS: CloudFormation: Stack] Mill (dently and Access Management) resources. Check this box only on the templates
		I Jacknowledge that this fearer	ate may create IAM resources.
			and the second se
			Cancel Back Next Stop
© 2008 - 2014, Amaz	on Web Services, Inc. or its affiliates. All r	ights reserved. History Policy Tame	e of the Feedback

emplate		
arameters	Review	
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	Manua	land WOTE
	Ternolate URL	https://s3.amazonaws.com/cf.templates.2195ky8surin.us.west.2/2014052Vfu
		XD75onAWS_RDG_CF_v1.template
	Description	"Version 0.99". This template creates a Virtual Private Cloud (VPC) with the base instance
		a XenApp farm (Use the Citrix CSP automation pack to complete.) Version 4. "WARNING" terrolate meates America EC2 Windows Instance and related resources. You will be billed fi
		AWS resources used if you create a stack from this template. Also, you are solely responsit
		complying with the license terms for the software downloaded and installed by this template
		creating a stack from this template, you are agreeing to such terms.
	Parameters	
	ADInstance Type	m3 medium
	ADPrivatelp	10.0.1.5
	AZ	us-west-1a
	BastionInstanceType	m1.small
	DomainAdminPasswor	Citrix@123
	d	
	DomainAdminUser	XenAdmin
	DomainDNSName	xencioud.net
	DomainNetBIOSName	vencloud, UC+net
	KeyPairName	XenCloud
	NATInstanceType	m1.smail
	NSCloudFormationURL	https://s3.amazonaws.com/cf-XenApp/NS_VPX_Template_v4.1.json 10.0.1.100
	NSSNIP	10.0.0.175
	PrivateCIDR	10.0.1.0/24
	RestoreModePassword	Citrix@123
	VPCCIDR	10.0.0.016
	VPCName	XenDesktop 7.5 VPC
	XD7DDCInstanceType	m3.large
	XD7ISOLocation	https://s3.amazonaws.com/cf-XenDesktop/ISO/XenApp_and_XenDesktop_7_5.iso
	XDAdminPassword	XDFamédmin
	Create IAM Resources	tue
	Options	
	1 dyp	
	Advanced	
	Auvanceu	
	Notification	pope
	Rollback on failure	Yes
		Cancel Back Create

When completed, click the checkbox next to the newly created Stack. Then click on the Outputs tab to display the management IP addresses of the NetScaler and Bastion management server.

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Server Total Basers (see Sugar Passion Say Pag								
Kay	Value		Description					
Densit/Certraliar 102335			IP address of the domain controller.					
skiegDelkeryController 103.1.250			IP address of the XanDealdop 7 Dealtop Delivery Controller					
EastorDatioP 54.185.45.5			External IP address of the Bastion heat in A21. ROP to this IP address as Dom					
Neticalar	50-0.5.500		${\rm F}$ address (NSF) of the Helfscaler, Brown to this ${\rm F}$ address as noted (surse, .					

Start connecting to the cloud

Install and Configure NetScaler VPX On-Premise (if not existing)

Only two nics/SNIPs required; private and public.

Click Enable Management Access when creating both interfaces.

Keep management enabled on both if management from across the tunnel is required.

NetScaler > Syst	tem > Network > IPs >	IPV4s					0 0	H
(PV4s	IPV6s							
Add.	pen	• •					Search	-
IP Address	Traffic Domain ID	State	Туре	Mode	ARP	ICMP	Virtual Server	
192.168.89.65	0	Enabled	Netscaler IP	Active	ENABLED	ENABLED	-N/A-	
192.168.89.64	0	Enabled	Subnet IP	Active	ENABLED	ENABLED	-N/A-	
100.217.248.2	N 0	Enabled	Subnet IP	Active	ENABLED	ENABLED	-N/A-	
	ч				25 Per Page	•	- 3 of 3 1	•

afigure IP				
IP Address	192 - 168 - 89 - 64	Netmask	255 255 255	i . 0
Туре	Subnet IP	Mode	Active	
Virtual Router ID		 ICMP Response* 	NONE	•
ARP Response*	NONE	Traffic Domain ID		
Options				
ARP ICMP	Virtual Server	Dynar	nic Routing	
Host Route				
Enable				
Gateway IP	· · · · ·	Metric		
OSPF LSA Type				
TYPES TYPE1	Area			
Vserver RHI Level				
NONE ® ONE_VSE	ERVER O ALL_VSERVERS			
Application Access Co	ntrols			
🕑 Enable Manageme	ent Access control to support the bel	ow listed applications.		
Allow access to mana IP address.	generations on this	S2H	SNMP	
🕑 GUI				
Secure Access only	y .			
Allow access only	to management applications			
			0	Close

Create a Remote Desktop Services (RDS) connection to the Bastion management server in Amazon Web Services (AWS) by connecting to the Elastic IP (EIP).

Note: The Bastion management server also is pre-configured for RDS connectivity to the private subnet of the VPC.

Note: To configure the AWS NetScaler, a second RDS connection must be made from the Bastion management server to the Domain controller in the private subnet in the cloud.



Install a valid license on the AWS NetScaler VPX.

Make note of the NetScaler Host ID which will be used during license activation and allocation on citrix.com.

Refer to the NetScaler Administration Guide in the Resources section for details on NetScaler licensing.

NetScaler > System > System Informat	ion
System Information System Sess	ions
Upgrade Wizard Reboot Statistic	s Call Home
System Information	
System IP	10.0.1.100
Netmask	255.255.255.0
Number of Mapped IP(s)	
Node	Standalone
Time Zone	Coordinated Universal Time
System Time	Tue, 18 Mar 2014 19:50:42 UTC
Last Config Changed Time	Tue, 18 Mar 2014 18:56:39 UTC
Last Config Saved Time	Tue, 18 Mar 2014 06:40:08 UTC
Hardware Information	
Platform	NetScaler Virtual Appliance 450040
Manufactured on	2/17/2009
CPU	1800 MHZ
Host Id	065fb939b2a0
Serial no	HE2H91SCZ6
Encoded serial no	98310000cb254307ee78

0 0 8

-N/A--N/A-

ENABLED ENABLED

ENABLED -N/A

NetScaler > System > Network > IPs > IPV4s

Enabled Subnet IP Active

IPV4s IPV4 Add... Opcn...

10.0.0.175

10.0.1.102

100.217.248.3

When configuring the AWS NetScaler VPX, three additional SNIPs required. These will correlate and connect to the private subnet, the public subnet and the CloudBridge network. In this example, the 10.0.0.175 IP correlates to the public subnet, the 10.0.1.102 IP to the private, and the 100.217.248.3 to the CloudBridge network.

Enable management access on all three SNIPs.

When configuration is complete, management access is only required on the public SNIP for management access from the on-premise environment.

In AWS Management Console, bind the EIP to the Public SNIP of the NetScaler.

Figure IP			
		_	
Address	10 . 0 . 0 . 175	Netmask	255 . 255 . 255 . 0
pe	Subnet IP	Mode	Active
irtual Router ID	~	ICMP Response*	NONE
RP Response*	NONE	Traffic Domain ID	~
ptions			
🖉 ARP 🗹 ICMP	Virtual Server	Dyna Dyna	imic Routing
lort Route			
Eastela			
- cristine			





Amazon AWS CloudBridge Connector Pre-Requisites

Verify and configure the following AWS security groups as follows:

- XA75HybridPOC-NATSecurityGroup
- XA75HybridPOCPublicSecurityGroup
- XA75HybridPOCPrivateSecurityGroup

Confirm the inbound and outbound TCP and UDP rules for each security group. See below for specific ports and protocols.

For reference, ensure inbound TCP and UDP port rules for the Public and NAT Security Group match this table.

Note: This port configuration is the minimum requirement. Additional ports may be added as necessary. (i.e. ICMP for testing connectivity)

*These ports are optional for Active Directory LDAP. The only required LDAP is TCP/UDP 389. See Resources section for detailed information on Microsoft Active Directory port requirements.

**These ports are required only for DHCP. If DHCP is not required in the AWS XenDesktop site, they can be excluded.

1 Services -	681 ×						-	t a machine *	Orego	1 146	1
EC2 Cellboard	Create National Interface	Inter Detect	Actions *								•
Tapi Reports	Filter: All VPC setwork interface	es = 0, Search Network	i Interfaces . H					1 to 7 of 7 Netw	rock ind	rices	
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Aits Scaling Groups	NTTP	102	00	66600	
	Outline TOP Bale	102	4001	66640	
	Outlon TOP Role	102	3008 - 3011	66600	
	DNS	LIDP	43	60000	

Protocol	Port(s)	Src/Dest	Protocol	Port(s)	Src/Dest
TCP	22	0.0.0.0/0	TCP	3389	0.0.0.0/0
TCP	25	0.0.0.0/0	TCP	4001	0.0.0.0/0
TCP/UDP	53	0.0.0.0/0	TCP	7279	0.0.0/0
TCP	80	0.0.0.0/0	TCP	8008	0.0.0.0/0
TCP/UDP	88	0.0.0.0/0	TCP	8083	0.0.0/0
TCP	135	0.0.0.0/0	TCP	27000	0.0.0.0/0
TCP	139	0.0.0.0/0	TCP	3268	0.0.0.0/0
TCP/UDP	389	0.0.0.0/0	UDP**	67	0.0.0.0/0
TCP	445	0.0.0.0/0	UDP	123	0.0.0.0/0
TCP	464	0.0.0.0/0	UDP	138	0.0.0.0/0
TCP*	636	0.0.0.0/0	UDP	161	0.0.0.0/0
TCP	1494	0.0.0.0/0	UDP	500	0.0.0.0/0
TCP	443	0.0.0.0/0	UDP**	2535	0.0.0.0/0
TCP	2598	0.0.0.0/0	UDP	3003	0.0.0.0/0
TCP*	3008- 3011	0.0.0.0/0	UDP	4500	0.0.0.0/0
TCP*	3269	0.0.0.0/0			

For reference, ensure inbound TCP and UDP port rules for the Private Security Group match this table.

Note: This port configuration is the minimum requirement. Additional ports may be added as necessary. (i.e. ICMP for testing connectivity)

*These ports are optional for Active Directory LDAP. The only required LDAP is TCP/UDP 389. See Resources section for detailed information on Microsoft Active Directory port requirements.

**These ports are required only for DHCP. If DHCP is not required in the AWS XenDesktop site, they can be excluded.

Edit the AWS route table for the private subnet as follows:

- Determine the VPC ID; in this example; vpc-f78b6392.
- Determine the route table ID for the private subnet; in this example rtb-8224c0e7.
- Determine the private ENI (Ethernet network interface) for the AWS NetScaler; in this example eni-60748f17.
- Create a new private route direction traffic destined for the private onpremise subnet, to the private ENI of the AWS NetScaler.

Verify that the default route on AWS NetScaler is pointing to the public gateway. In this example, the public gateway is 10.0.0.1.

	Port(s)	Src/Dest	Protocol	Port(s)	Src/Dest
TCP	22	0.0.0/0	TCP*	3268	0.0.0.0/0
TCP	25	0.0.0.0/0	TCP*	3269	0.0.0/0
TCP/UDP	53	0.0.0/0	TCP	3389	0.0.0.0/0
TCP	80	0.0.0.0/0	TCP	4001	0.0.0.0/0
TCP/UDP	88	0.0.0.0/0	TCP	7279	0.0.0.0/0
TCP	135	0.0.0.0/0	TCP	8008	0.0.0.0/0
TCP	139	0.0.0.0/0	TCP	8083	0.0.0.0/0
TCP/UDP	389	0.0.0.0/0	TCP	27000	0.0.0.0/0
TCP	445	0.0.0.0/0	UDP**	67	0.0.0.0/0
TCP	464	0.0.0.0/0	UDP	123	0.0.0.0/0
TCP*	636	0.0.0.0/0	UDP	138	0.0.0.0/0
TCP	443	0.0.0.0/0	UDP	161	0.0.0.0/0
TCP	1494	0.0.0.0/0	UDP**	2535	0.0.0.0/0
TCP	2598	0.0.0.0/0	TCP*	3268	0.0.0.0/0
TCP	3008- 3011	0.0.0.0/0	UDP	16500- 16509	0.0.0/0

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our VPCs	2	rtb-82240	267	1 Subnet	No	vpc-f78b6c92 (10.0.0.0/16)	5			
ubnets		rtb-8124c	064 1	D Subnets	Yes	vpc-f78b6c92 (10.0.0.0/16)	- 0			
dernet Galewaya		rtb-01755	364 1) Subnets	Yes	vpc-9b8969fe (10.0.0.0/16)				
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		0.0.0.0/0		eni-7d740f0a /	i-daeefcd3	active	No	Remove		
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Add	Open Rem	ove	•						Search -
Network	Netmask	Gateway/Own	ed IP/Name	Traffic Domain	ID	State	Distance	Flags	Advertise / Via
0.0.0.0	0.0.0.0	10.0.0.1			0	OUP	1	STATIC	No
127.0.0.0	255.0.0.0	127.0.0.1			0	OUP	0	PERMANENT	No
10.0.0.0	255.255.255.0	10.0.0.175			0	OUP	0	DIRECT	No
10.0.1.0	255-255-255.0	10.0.1.100			0	OUP	0	DIRECT	No
100.217.248.0	255-255-255-240	100.217.248.3			0	OUP	0	DIRECT	No
192.168.89.0	255-255-255.0	100.217.248.2			0	OUP	1	STATIC	No
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						25 Per Pa	ige 💌 🛛	1 - 6 of 6	1

On-premise CloudBridge connector pre-requisites

Configure on-premise internet router by creating the following routes:

- Inbound port 500 UDP traffic to the private SNIP on the on-premise NetScaler.
- Inbound port 4500 UDP traffic to the private SNIP on the on-premise NetScaler.
- Outbound traffic destined for the cloud bridge network routed to the private SNIP on the on-premise NetScaler.
- Outbound traffic destined for the AWS public subnet routed to the private SNIP on the on-premise NetScaler.
- Outbound traffic destined for the AWS private subnet routed to the private SNIP on the on-premise NetScaler.

Direction	Protocol	Destination	Port	Interface
IN	UDP	NetScaler Private SNIP	500	NA
IN	UDP	NetScaler Private SNIP	4500	NA
OUT	TCP	Cloud Bridge Network	ALL	NetScaler Private SNIP
OUT	TCP	AWS Public Subnet	ALL	NetScaler Private SNIP
OUT	TCP	AWS Private Subnet	ALL	NetScaler Private SNIP

In this example:

Direction	Protocol	Destination	Port(s)	Interface
IN	UDP	192.168.89.64	500	NA
IN	UDP	192.168.89.64	4500	NA
OUT	TCP	100.217.248.0	ALL	192.168.89.64
OUT	TCP	10.0.0.0	ALL	192.168.89.64
OUT	TCP	10.0.1.0	ALL	192.168.89.64

Install and configure CloudBridge connector

As a final step to enable the extension to the AWS cloud, a secure connection will be created between the on-premise network and the AWS public subnet. This will be accomplished by setting up a CloudBridge Connector between the on-premise and AWS NetScalers using the previously configured bridge network. In this example, the 100.217.248.2 SNIP on-premise and the 100.217.248.3 SNIP in AWS.

Log in to the on-premise NetScaler.

Create CloudBridge Connector.

Select Amazon Web Services.

Select Amazon Web Services.

Enter the AWS Access Key ID and Secret Key ID.

Click Continue.

Enter EIP address of the AWS NetScaler.

Enter NetScaler admin credentials.

Note: The default NetScaler administrator username and password is nsroot/ nsroot. This should be changed to a strong, unique password as soon as possible. Refer to the NetScaler Administration in the References section for details on Admin password changes.

Click Continue.

Verify the Access Key ID and NetScaler IP address.

Configure the Connector Settings as follows:

- CloudBridge Connector Name
- Private SNIP of the on-premise NetScaler.
- Check the "NetScaler Behind NAT" checkbox
- Public (NAT or forwarded) SNIP of the on-premise NetScaler.
- Private SNIP of the AWS NetScaler.
- Check the "NetScaler Behind NAT" checkbox.
- Elastic IP that is bound to the public SNIP of the AWS NetScaler.
- Chose the AES Encryption Algorithm.
- Chose the SHA512 Hash Algorithm.
- Chose to Auto Generate Keys.
- Click Continue.





Verify the Connector Name, Local IP settings, Remote IP settings.

Click Done.



The CloudBridge Connector will now be created and the connector status page will appear. The connector status on the right side should be displayed with a green indicator.

If the status page does not appear, error messages are displayed, or the status indicator is red, see the CloudBridge Connector Admin Guide in the References section for troubleshooting steps.

AWS XenDesktop site pre-requisites

In preparation for the creation of the AWS XenDesktop site, the following steps need to be completed on the Delivery Controller.

- Assign a static IP address to the Delivery Controller within the private AWS subnet.
- Rename the Delivery Controller appropriately for your corporate domain naming convention.
- Configure DNS resolution between the Delivery controller and your corporate DNS infrastructure.
- Add the Delivery Controller to the corporate domain.

Note: Repeat the above steps for the Windows desktop server gold image (VDA Master) as well.





Creating the desktop server base image

Log into the AWS Management Console.

Select the VDA Master instance from the list.

Click the Actions menu and select Create Image.

Enter a friendly name and description for this base image.

Click Create Image.

When the Create Image request dialog appears, click Close.





Create Image × ×

Create Image and cache in the second sec

The newly created base image will appear in the AMI list.

Note: The new base image may display a Pending status for several minutes before becoming available. Note the AMI ID.

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AWS XenDesktop site creation

Install XenDesktop 7.5 on the Delivery Controller server instance.



When XenDesktop is full installed on the Delivery Controller, launch Citrix Studio.

On the welcome screen, click the Deliver Applications bar under Site Setup.

Enter the desired AWS XenDesktop site name.

Click Next.



Click Test Connection to ensure proper communications.

Click Next.

Enter the name of the on-premise Citrix licensing server.

Click Connect.



Cancel

Studio	Licensing License server address	abdc1.home.local	Connect ,
Introduction			
^r Database Licensing Connection Network	I want to: Use the free 30 You can add a Use an existing The product lis	day trial icense later. license t below is generated by th	e license server.
Storage App-V Publishing Summary	Product		Madel
	Allocate and dow	mload	rae file



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CITRIP

If prompted, select Connect Me to trust the certificate associated with the licensing server.

Click Confirm.

Select Use an Existing License, and chose the appropriate XenDesktop license for this site.

Click Next.

In the Connection	Туре	pull	down,	select
Amazon EC2.				

Select to create virtual machines with Machine Creation Services.

Click Next.

Enter the appropriate API Key (Access Key) and Secret Key.

Enter a name for this EC2 connection.

Click Next.



Studio

Studio

This certificate is not trusted:

All services have not been configured.

Connect me I trust this ser

Certificate Authentication

labdc1.home.local

ver, remember it next time I connect

Back Next Cancel

Rack Next Cancel

Do not connect me I need to verify that this server is secure.

> Use the free 30-day trial You can add a license late
> Use an existing ficense

Select the appropriate Cloud Region and VPC.

Note the correct VPC ID.

Select the appropriate Availability Zone.

Click Next.

Ansase
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 Castan analanda jana sakan jana sa

Virtual Mach

n us-west-2

Studio

Studio

Enter a friendly name for these AWSbased network resources.

Select the AWS private subnet.

Click Next.

Select No to disable App-V publishing.

Click Next.

Note: This example does not include the publishing of App-V based applications. However, if App-V delivered applications are to be hosted in the cloud, the on-premise App-V management and publishing server information can be entered during this step.

Review Site Summary details and ensuring the accuracy of all parameters.

Click Finish.



Eack Nove Cancel

Introduction Database Licensing Connection VM Location Network	Site name: Delabase server: Delabase name: License server: Connection spee Connection name Create virtual machines with: Virtual private cloud: deviliability name	AWEDektops xdT5dektops tabbet.home.local Amazon EC2 AWS-West-Oregon Studio tools (Machine Creation Services) vgo-178/6-92	
Summary	Networks: App-V:	10.0.1.0/24 (vpc-f7866c92) Not configured	

Machine catalog creation

On the welcome screen, click the Set-up Machines for Desktops and Applications bar under Machine Catalogs. Alternatively, right-click on the Machine Catalogs node and selecting Create Machine Catalog.



Studio

Select Windows Server OS.

Click Next.

Select Machines that are Power Managed.

Select Machine Creation Services as the deployment method.

Click Next.



Back Next Cancel

Select the base server image created in the previous section, from the list of machine templates. Note the AMI ID.

Click Next.



Select the appropriate AWS private security group.

In this example; XA75HybridPOC-PrivateSecurityGroup.

Click Next.

Select one or more security groups for the virtual machines. T selected Resource supports a maximum of 5 security groups p	he virtual private cloud in the er virtual machine.
Mana	
PLATES.	Description
XA75HybridPOC-PrivateSecurityGroup-YAEFP1YLQ027	Private Security Group
🛄 default	default VPC security group
XA75HybridPOC DomainMemberSG QJI396DVA1A1	Domain Members
X475HybridPOC-BastionSecurityGroup-1L8CYG0U6CGDD	Enable RDP access from the li
XA75HybridPOC-PublicSecurityGroup=10bX1FGK082RY	Public Security Group
Open	Test
XA75HybridPOC-DomainControllerSG-2D33W646XL85	Domain Controller
XA75HybridPOC-NATSecurityGroup-38FO4SWGCQN4	Enables SSH access to NAT in
How would you like your machines to be deployed in the cloue	2 Learn more
Use shared hardware Inis setting is suitable for most deployments.	
Use hardware that is dedicated to my account This setting is more suitable for deployments with specifi requirements.	c security or compliance
	Comment of the second sec

Virtual Ma

Studio

Enter the number of virtual machines to be created.

Select the desired virtual machine specification.

Click Next.

Select the network and network inter	ace
associated with the AWS private subr	iet.

Click Next.

		Machine Catalog Setup	
itudio	Network h	nterface Cards	
The states	Add Netwo	rk Interface Cards for machines in thi	s catalog.
introduction	Name	Associated Network	Enable/disable card
Operating system	•	10.0.1.0/24 (vpc-178b6c92)	M
Machine Management			
Machine Template			
Security			
Virtual Machines	Add card	Remove	
Network Cards			
Computer Accounts	Select the r	etwork that this network interface ca	rd will use.
Summary	Name		+
	• 10.0.1	0/24 (vpc-f78b6c92)	
			Back Next Cancel

Back

Select Create new Active Directory accounts.

Select an Active Directory OU for the newly created accounts.

Enter a machine account naming convention.

Click Next.



Enter a Machine Catalog friendly name and description.

Click Finish.

Studio	Summary	
 Introduction Operating System Machine Management Machine Template Security Virtual Machines Network Cercls 	Machine type: Machine management: Provisioning methodi Resource: Machine Lemplate: Netwoork interface ander Number of Web to create: Security Groups: Deployment:	Windows Server OS Virtual Radhee creation service (MCS) AVX-Vince Finite DTP-public line (4553366) 0 - Unity BULLID24 (spc-F788in422) 0 - Graph De shared bandsone
Summary	Machine Catalog name:	
	Machine Catalog description for Soles office overseas To complete the deployment, a Delivery Groups and then Creat	or administrators: (Optional) ssign this Machine Catalog to a Delivery Group by selecting e or Edit a Delivery Group.

Delivery group creation

Right click on the Delivery Group node and select Create Delivery Group.



Chose the appropriate Machine Catalog.

Enter the desired number of virtual machines to allocate to this Delivery Group.

Select Next.



Select Desktops.

Click Next.

Note: If applications are to be delivered from the AWS site, either Desktop and Applications or Applications can be chosen here. In this example, only Desktops are being delivered.

Studio	Delivery Type You can use the machines in the Catalog to deliver desktops and applications to your users.
✓ Introduction ✓ Introduction ✓ Mathines Delivery Type Users StoreFront Summary	User translations to deform: To charlos y and applications Applications
	Back Const

Studio

Studio

✓ Introduction
 ✓ Machines
 ✓ Delivery Typ
 ✓ Users
 StoreFront
 Summary

Users

Add users_ Rem

To get started, add a

Add new

Back Next Cancel

Back Rest Cancel

Click Add Users and select the Active Directory group(s) that contain the intended XenDesktop users.

Click Next.

Select to Automatically configure Receiver with a list of StoreFront servers.

Click Add New.

Enter the name and URL of at least one
on-premise StoreFront server.

Click Ok.

Add StoreFront Server	
Enter the details of an existing StoreFront server that you want to be available from Receiver.	
StoreFront server name:	i
storefront.home.local	
Description:	1
Un-prem Storerront	
https://storefront.home.local	
OK Cancel	

Click the checkbox next to the newly added StoreFront server(s).

Click Next.



Enter a friendly name and display name for the Delivery Group.

Optionally, enter a description for the Delivery Group.

Click Finish.

Studio	Summary	
	Machine Catalog:	AWS Published Desktop 8 G8
Introduction	Machine type:	Windows Server OS
Machines	Allocation type:	Random
P Delivery Type	Machines added	1 unassigned
/ Users	Users	HOMFD Domain Users
✓ StoreFront	Scopes	
Summary		
	Delivery Group name:	
	AWS IT 8 G8	
	Display name:	
	AWS 8GB	
	Delivery Group description	a, used as label in Receiver (optional):
	laws agai	

Note: It may take several minutes for the newly created Delivery Group machines to register with the site.

a	Citrix Studio		x
File Action View Help			
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Concole Root	circur	Actions	
Search	citrix	Delivery Groups	
Machine Catalogs	Delivery Groups Applicators (2)	🛅 Create Delivery Group	
A Delivery Groups	Delivery Group & Machine type No. of machines Sectors In use No. of applications	Vew	٠
Policies	AWS IT 8 G8 Windows Server 1 0 0	Refresh	
A Configuration	State: Enabled Unregistered: 0 Disconnected: 0	Help	
Controllers Heating & Licensing Story Voldiabil			
Citais StoreFront			
	No Item selected		
< = >			

On-premise StoreFront integration

Open the on-premise StoreFront server Admin console.

Select the Stores node, and then click on the desired store URL.

In the right hand pane, select Manage Delivery Controllers.

Click Add.

citreix	Stores
Mo Mo CoudL. Yes https://tonefront.home.local/Obio/CoudLab	Create Store Export Multi Store Provisioning Rie
	Vew
	C helvesh
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	Choudt ob
CloudLab	Hide Store Planage Delivery Controllers
Advertised Yes URu Mitps://tiseet/wit.home.local/Citrix/Devel.ab	Planage Otics Receiver Updates Integrate with Otics Online Export Provisioning File Configure Leasery Support
Status	Generate Security Keys
	Renove Store

age Delivery Contro	lers	
fanage Delivery O	ontrollers	
pecify the delivery co	ntrollers and servers for this store.	
hiame	Tune	Saniard
XAController	XenApp	192.168.89.67
XDController	XenDesktop	192.168.89.59
Add Ed	t Remove	
		OK Cancel

Enter a display name for this Delivery Controller.

Select XenDesktop as the Delivery Controller type.

Click Add and enter the private IP address of the AWS Delivery Controller.

Click Ok.

Click Ok.

Display name:	AWSDesktop
Type:	XenDesktop
	🔘 XenApp
	AppController
	○ VDI-in-a-Box
Servers (in failover order):	100110
	Add Edit Remove
Transport type:	HTTP -
Port:	80
	OK Cancel

Add Delivery Controller

Manage Delivery Controllers

Anage Delivery Controllers

Spacify the delivery controllers and servers for this store.

Delivery controllers:

Name Type Servers
XACcontroller XenOpp 192:1658:97
XACcontroller XenOpp 192:1658:95

XACcontroller XenOpetatop 100:110

Add_ Edit. Remove

Concernent

Conclusion

XenDesktop 7.5 and XenApp 7.5 have been redesigned as cloud ready solutions for delivering any Windows application or desktop into a cloud service delivered across any network, to any device. By deploying this expanded app and desktop delivery platform today, you will be positioned to leverage any virtual infrastructure or cloud management platform giving you the ability to take advantage of the automation and orchestration capabilities of cloud computing.

Resources and tools

Citrix related information

The Citrix CloudFormation template download

https://s3.amazonaws.com/cf-XenDesktop/XD75NSonAWS_CF_v1_2.json

XenDesktop 7.5 admin guide

http://support.citrix.com/proddocs/topic/xenapp-xendesktop/cds-xenapp-xendesktop-75-landing.html

Information on ICA bandwidth requirements

http://blogs.citrix.com/2013/08/27/get-up-to-speed-on-xendesktop-bandwidthrequirements NetScaler VPX admin guide

http://support.citrix.com/proddocs/topic/netscaler-10-1/ns-gen-nsvpx-wrappercon-10.html

Get Citrix product evaluation licenses

http://www.citrix.com/downloads/trials.html

CloudBridge connector admin guide

http://support.citrix.com/proddocs/topic/ns-system-10-1-map/CBC-wrapper-con.html

CloudBridge admin guide

http://support.citrix.com/proddocs/topic/cloudbridge/cb-wrapper-72-con.html

Citrix StoreFront planning guide

http://support.citrix.com/article/CTX136547

Installing CloudBridge VPX in AWS

http://support.citrix.com/article/CTX136046

Security guidelines for virtual desktops

http://support.citrix.com/article/CTX134780

Amazon AWS related information

Microsoft platform security whitepaper

http://media.amazonwebservices.com/AWS_Microsoft_Platform_Security.pdf

Creating a custom route table in AWS

http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_Internet_ Gateway.html#Add_IGW_Routing

AWS NAT instances

http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_NAT_Instance. html#nat-routing-table

3rd party resources

Windows Server 2012 read-only domain controller configuration

http://technet.microsoft.com/en-us/library/jj574152.aspx

Windows Server 2008 read-only domain controller configuration

http://technet.microsoft.com/en-us/library/cc772234.aspx

Active directory and active directory domain services port requirements:

http://technet.microsoft.com/en-us/library/dd772723%28WS.10%29.aspx

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About Citrix

Citrix (NASDAQ:CTXS) is a leader in virtualization, networking and cloud infrastructure to enable new ways for people to work better. Citrix solutions help IT and service providers to build, manage and secure, virtual and mobile workspaces that seamlessly deliver apps, desktops, data and services to anyone, on any device, over any network or cloud. This year Citrix is celebrating 25 years of innovation, making IT simpler and people more productive with mobile workstyles. With annual revenue in 2013 of \$2.9 billion, Citrix solutions are in use at more than 330,000 organizations and by over 100 million people globally. Learn more at www.citrix.com.

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