Visual Effects Workstations on the AWS Cloud with Teradici Cloud Access Software

Quick Start Reference Deployment

August 2018
Last update: December 2019 (revisions)

Eric Lotze, Product Education, Teradici, Inc.
Mark Stephens, Vinod Shukla, and Mike Owen
Solutions Architects, Amazon Web Services

Contents
Overview .................................................................................................................2
Working with Visual Effects on AWS .................................................................2
Costs and Licenses ...............................................................................................3
Architecture ............................................................................................................4
Prerequisites .........................................................................................................5
  Specialized Knowledge .....................................................................................5
Deployment Options ............................................................................................5
Deployment Steps .................................................................................................6
  Step 1. Prepare Your AWS Account .................................................................6
  Step 2. Obtain a Teradici Cloud Access Software License ................................7
  Step 3. Launch the Quick Start .......................................................................7
  Step 4. Install the Teradici Software Client and Test the Deployment ...........12
Best Practices for PCoIP on AWS ........................................................................15
Security ................................................................................................................15
This Quick Start deployment guide was created by Teradici, Inc. in collaboration with Amazon Web Services (AWS).

Quick Starts are automated reference deployments that use AWS CloudFormation templates to launch, configure, and run the AWS compute, network, storage, and other services required to deploy a specific workload on AWS.

Overview

This Quick Start reference deployment guide provides step-by-step instructions for deploying a Microsoft Windows-based, visual effects (VFX) workstation on the AWS Cloud.

This Quick Start is for those who use VFX software such as Blender, Houdini, and Nuke to transform their creative content. Users include large or small studios, broadcast news organizations, creative agencies, or anyone who needs a powerful graphics processing unit (GPU) workstation to manipulate content.

Working with Visual Effects on AWS

Working with video or models involves large, and, at times, many files. Amazon Simple Storage Service (Amazon S3) provides object storage that’s highly durable, secure, and scalable, making it the perfect location to store content long-term. With Amazon S3 storage classes, you can store large volumes of content in AWS cost-effectively, based on access patterns. This is important in the context of VFX and rendering, where models, frames, and video can be in the hundreds of terabytes or multiple petabytes of storage.

A low-latency link is also important when using a remote desktop solution. AWS Direct Connect will give you a consistent, low-latency network connection back to your studio. The AWS global infrastructure provides access to AWS services and workstations close to where the creative talent resides. This means the content stays in-region and remains secure.
Using AWS and Teradici’s PC-over-IP (PCoIP) technology, artists can modify content by connecting to a remote workstation instead of transferring large files to a local machine. The Teradici client runs on their desktop or laptop and gives access to an Amazon Elastic Compute Cloud (Amazon EC2) G3 instance. G3 instances are GPU instances that are designed for graphics-intensive workloads and offer a powerful, low-cost, pay-as-you-go model for high-end workstations.

This Quick Start deployment sets up an environment for VFX workstations on AWS that includes the following:

- **Teradici Cloud Access Software**, which is built on the PCoIP technology and provides an optimal protocol for delivering interactive applications. Teradici Cloud Access Software is installed on the G3 GPU instance and works with a software or hardware client to bring the desktop to the user.

- **Wacom tablet drivers** are installed so that digital artists can work with their familiar tools in the cloud.

### Notes

Currently, on Windows, Teradici supports bridged mode with Wacom devices. Bridged mode means Wacom driver commands are passed all the way to the Windows host operating system and back. A bridged Wacom device is highly sensitive to latency. For optimal performance, we recommend less than 15 ms of latency between the data center and where the Wacom driver is connected at the endpoint.

This Quick Start builds a base VFX workstation environment. After you deploy the Quick Start, you can install your preferred software tools by using the Bring Your Own License (BYOL) model.

### Costs and Licenses

You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using the Quick Start.

The AWS CloudFormation template for this Quick Start includes configuration parameters that you can customize. Some of these settings, such as instance type, will affect the cost of deployment. For cost estimates, see the pricing pages for each AWS service you will be using. Prices are subject to change.

Navigate to [https://connect.teradici.com/cas-demo](https://connect.teradici.com/cas-demo) to contact Teradici Sales with any questions or to purchase Cloud Access Software licenses. Alternatively, buy licenses
directly from the Teradici e-store. For more information about the plans and pricing, see the Teradici website.

Architecture
Deploying this Quick Start for a new virtual private cloud (VPC) with **default parameters** builds the following VFX workstation environment in the AWS Cloud.

The Quick Start sets up the following:

- A highly available architecture that spans two Availability Zones.*
- A virtual private cloud (VPC) configured with public and private subnets according to AWS best practices, to provide you with your own virtual network on AWS. You have complete control over your virtual networking environment, including selection of your...
own IP address range, creation of subnets, and configuration of route tables and network gateways.*

- An internet gateway to allow access to the internet.*

- In the public subnets, managed network address translation (NAT) gateways that allow outbound internet access to resources in the private subnets, but that prevent the internet from accessing those instances.*

- In the public subnets, one or more VFX host instances in an Auto Scaling group. Users will install Autodesk Maya, Nuke, and other VFX software on these instances to do their daily work.

- In the public subnets, one or more Remote Desktop Gateway (RD Gateway) instances in an Auto Scaling group, to provide readily available administrative access to the environment and to secure access to Microsoft Windows instances located in the private and public subnets. The RD Gateway instances use the Remote Desktop Protocol (RDP) over HTTPS to establish a secure, encrypted connection between remote users on the internet and Windows-based EC2 instances, without needing to configure a virtual private network (VPN) connection. This helps reduce the attack surface on your Windows-based instances and provides a remote administration solution for administrators.*

- In the private subnets, AWS Directory Service for Microsoft Active Directory, Enterprise Edition (AWS Managed Microsoft AD), which provides most of the features offered by Microsoft Active Directory plus integration with AWS applications. This service is used to manage user accounts and to allow computers to join domains.*

- AWS Identity and Access Management (IAM) roles so that AWS resources created through the Quick Start can access other AWS resources when required. These IAM roles enable access to data in Amazon S3.

* The template that deploys the Quick Start into an existing VPC skips the tasks marked by asterisks and prompts you for your existing VPC configuration.

**Prerequisites**

**Specialized Knowledge**

Before you deploy this Quick Start, we recommend that you become familiar with the following AWS services and components. (If you are new to AWS, see [Getting Started with AWS](https://aws.amazon.com/getting-started/).)

- [Amazon EC2](https://aws.amazon.com/ec2/)
- Amazon EC2 G3 instance
- Amazon S3
- Amazon VPC

We also recommend that you familiarize yourself with Cloud Access Software from Teradici.

Deployment Options
This Quick Start provides two deployment options:

- **Deploy the VFX workstation environment into a new VPC** (end-to-end deployment). This option builds a new AWS environment consisting of the VPC, private and public subnets, NAT gateways, security groups, and other infrastructure components, and then deploys the environment into this new VPC.

- **Deploy the VFX workstation environment into an existing VPC**. This option provisions the environment in your existing AWS infrastructure.

This Quick Start includes separate AWS CloudFormation templates for these options. The Quick Start also lets you configure CIDR blocks, instance types, and settings for the cloud VFX workstation environment, as discussed later in this guide.

Deployment Steps
**Step 1. Prepare Your AWS Account**

1. If you don’t already have an AWS account, create one at https://aws.amazon.com by following the on-screen instructions.

2. Use the region selector in the navigation bar to choose the AWS Region where you want to deploy a VFX workstation environment on AWS.

   **Important** This Quick Start uses G3 instances, which aren’t available in all AWS Regions. For more information, see the Amazon EC2 Pricing webpage, choose Windows, and check to make sure that the AWS Region you want to use for the deployment supports G3 instances.

3. Create a key pair in your preferred region.

4. If necessary, request a service limit increase for the Amazon EC2 G3 instance type. You might need to do this if you already have an existing deployment that uses this instance type, and you think you might exceed the default limit with this reference deployment.
Step 2. Obtain a Teradici Cloud Access Software License

1. Navigate to https://connect.teradici.com/cas-demo to contact Teradici Sales for Cloud Access Software licenses. Alternatively, buy licenses directly from the Teradici e-store.

2. Teradici will contact you via an email with your license key and links to the client download. You will use this information to install the Teradici client software in step 4.

Step 3. Launch the Quick Start

Note: You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using this Quick Start. For full details, see the pricing pages for each AWS service you will be using in this Quick Start. Prices are subject to change.

1. Choose one of the following options to launch the AWS CloudFormation template into your AWS account. For help choosing an option, see deployment options earlier in this guide.

<table>
<thead>
<tr>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deploy VFX environment into a new VPC on AWS</td>
<td>Deploy VFX environment into an existing VPC on AWS</td>
</tr>
<tr>
<td><img src="Launch" alt="Launch Option 1" /></td>
<td><img src="Launch" alt="Launch Option 2" /></td>
</tr>
</tbody>
</table>

Important: If you’re deploying the environment into an existing VPC, make sure that your VPC has two private subnets in different Availability Zones for the AWS Directory Service instances. These subnets require NAT gateways or NAT instances in their route tables, to allow the instances to download packages and software without exposing them to the internet. You will also need the domain name option configured in the DHCP options as explained in the Amazon VPC documentation. You will be prompted for your VPC settings when you launch the Quick Start.

Each deployment takes about 30 minutes to complete.

2. Check the region that’s displayed in the upper-right corner of the navigation bar, and change it if necessary. This is where the network infrastructure for the VFX host environment will be built. The template is launched in the US East (Ohio) Region by default.
Important This Quick Start uses G3 instances, which aren’t available in all AWS Regions. For more information, see the Amazon EC2 Pricing webpage, choose Windows, and check to make sure that the AWS Region you want to use for the deployment supports G3 instances.

3. On the Select Template page, keep the default setting for the template URL, and choose Next.

4. On the Specify Details page, change the stack name if needed. Review the parameters for the template. Provide values for the parameters that require input. For all other parameters, review the default settings and customize them as necessary. When you finish reviewing and customizing the parameters, choose Next.

In the following tables, parameters are listed by category and described separately for the two deployment options:

- Parameters for deploying into a new VPC
- Parameters for deploying into an existing VPC

**Option 1: Parameters for deploying into a new VPC**

View template

**Network Configuration:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Availability Zones</strong></td>
<td><strong>Requires input</strong></td>
<td>The specific Availability Zones you want to use for resource distribution. This field lists the Availability Zones within your selected region. Choose two Availability Zones from this list. The Quick Start preserves the logical order that you specify.</td>
</tr>
<tr>
<td><strong>VPC CIDR</strong> (VPCCIDR)</td>
<td>10.0.0.0/16</td>
<td>The CIDR block for the VPC. The CIDR block parameter must be in the form x.x.x.x/16-28.</td>
</tr>
<tr>
<td><strong>Private Subnet 1 CIDR</strong> (PrivateSubnet1CIDR)</td>
<td>10.0.0.0/19</td>
<td>The CIDR block for the private subnet located in Availability Zone 1. The CIDR block parameter must be in the form x.x.x.x/16-28.</td>
</tr>
<tr>
<td><strong>Private Subnet 2 CIDR</strong> (PrivateSubnet2CIDR)</td>
<td>10.0.32.0/19</td>
<td>The CIDR block for the private subnet located in Availability Zone 2. The CIDR block parameter must be in the form x.x.x.x/16-28.</td>
</tr>
<tr>
<td><strong>Public Subnet 1 CIDR</strong> (PublicSubnet1CIDR)</td>
<td>10.0.128.0/20</td>
<td>The CIDR block for the public (DMZ) subnet located in Availability Zone 1. The CIDR block parameter must be in the form x.x.x.x/16-28.</td>
</tr>
</tbody>
</table>
### Amazon EC2 Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EBS Volume Size for EC2 Instance</strong></td>
<td>100</td>
<td>The volume size for the VFX host instances, in gibibyte (GiBs). You can specify 100-16,000 GiBs.</td>
</tr>
<tr>
<td><strong>Key Pair Name</strong></td>
<td>Requires input</td>
<td>A public/private key pair, which allows you to connect securely to your instance after it launches. When you set up an AWS account, this is the key pair you created in your preferred region.</td>
</tr>
<tr>
<td><strong>Remote Desktop Gateway Instance Type</strong></td>
<td>t2.large</td>
<td>The Amazon EC2 instance type for the Remote Desktop Gateway instances.</td>
</tr>
<tr>
<td><strong>Number of VFX Hosts</strong></td>
<td>1</td>
<td>The number of VFX hosts to create. You can choose up to 8 hosts.</td>
</tr>
<tr>
<td><strong>VFX Host Instance Type</strong></td>
<td>g3.4xlarge</td>
<td>The Amazon EC2 instance type for the VFX host servers. You can choose from G3 GPU instance types for accelerated VFX workstation performance.</td>
</tr>
</tbody>
</table>

### Microsoft Active Directory Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain DNS Name</strong></td>
<td>example.com</td>
<td>The fully qualified domain name (FQDN) of the forest root domain. The name must be 2-255 characters.</td>
</tr>
<tr>
<td><strong>Domain NetBIOS Name</strong></td>
<td>example</td>
<td>The NetBIOS name of the domain (1-15 characters) for users of earlier versions of Windows.</td>
</tr>
<tr>
<td>Parameter label (name)</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Restore Mode Password</strong> (RestoreModePassword)</td>
<td><strong>Requires input</strong></td>
<td>The password for a separate administrator account when the domain controller is in restore mode. The password must be 8-32 characters, consisting of letters, numbers, and symbols.</td>
</tr>
<tr>
<td><strong>Admin</strong> (DomainAdminUser)</td>
<td>Admin</td>
<td>The user name (5-25 alphanumeric characters) for the account that will be added as domain administrator. This account is separate from the default administrator account.</td>
</tr>
<tr>
<td><strong>Domain Admin Password</strong> (DomainAdminPassword)</td>
<td><strong>Requires input</strong></td>
<td>The password for the domain administrator user. The password must be 8-32 characters, consisting of letters, numbers, and symbols.</td>
</tr>
</tbody>
</table>

**Microsoft Remote Desktop Gateway Configuration:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Remote Desktop Gateway Hosts</strong> (NumberOfRDGWHosts)</td>
<td>1</td>
<td>The number of Remote Desktop Gateway hosts to create. You can choose up to 4 hosts. In a production environment, we recommend specifying at least 2 hosts for full failover support.</td>
</tr>
</tbody>
</table>

**AWS Quick Start Configuration:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quick Start S3 Bucket Name</strong> (QSS3BucketName)</td>
<td>aws-quickstart</td>
<td>The S3 bucket you have created for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. The bucket name can include numbers, lowercase letters, uppercase letters, and hyphens (-), but should not start or end with a hyphen (-).</td>
</tr>
<tr>
<td><strong>Quick Start S3 Key Prefix</strong> (QSS3KeyPrefix)</td>
<td>quickstart-vfx-workstation-windows/</td>
<td>The S3 key name prefix used to simulate a folder for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. This prefix can include numbers, lowercase letters, uppercase letters, hyphens (-), and forward slashes (/).</td>
</tr>
</tbody>
</table>
Option 2: Parameters for deploying into an existing VPC

View template

Network Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC ID (VPCID)</td>
<td>Requires input</td>
<td>The ID of your existing VPC (e.g., vpc-0343606e).</td>
</tr>
<tr>
<td>Public Subnet 1 ID (PublicSubnet1ID)</td>
<td>Requires input</td>
<td>The ID of the public subnet 1 in Availability Zone 1 of your existing VPC (e.g., subnet-e3246d8e).</td>
</tr>
<tr>
<td>Public Subnet 2 ID (PublicSubnet2ID)</td>
<td>Requires input</td>
<td>The ID of the public subnet 2 in Availability Zone 2 of your existing VPC (e.g., subnet-b58c3d67).</td>
</tr>
</tbody>
</table>

Amazon EC2 Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFX Host Instance Type (VFXHostInstanceType)</td>
<td>g3.4xlarge</td>
<td>The Amazon EC2 instance type for the VFX host servers. You can choose from G3 GPU instance types for accelerated VFX workstation performance.</td>
</tr>
<tr>
<td>Number of VFX Hosts (NumberOfVFXHosts)</td>
<td>1</td>
<td>The number of VFX hosts to create. You can choose up to 8 hosts. In a production environment, we recommend specifying at least 2 hosts for full failover support.</td>
</tr>
<tr>
<td>EBS Volume Size for EC2 Instance (EBSVolumeSize)</td>
<td>100</td>
<td>The volume size for the VFX host instances, in gibibyte (GiBs). You can specify 100-16,000 GiBs.</td>
</tr>
<tr>
<td>VFX Host Access CIDR (VFXHostAccessCIDR)</td>
<td>10.0.128.0/20</td>
<td>The CIDR block to control authorized access to the VFX host instances. The CIDR block parameter must be in the form x.x.x.0/16-28. We recommend that you set this value to a trusted IP range. For example, you might want to grant only your corporate network access to the software. For more information, see Security later in this guide.</td>
</tr>
<tr>
<td>Key Pair Name (KeyPairName)</td>
<td>Requires input</td>
<td>The public/private key pairs allow you to securely connect to your instance after it launches.</td>
</tr>
</tbody>
</table>

Microsoft Active Directory Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain DNS Name (DomainDNSName)</td>
<td>example.com</td>
<td>The fully qualified domain name (FQDN) of the forest root domain. The name must be 2-255 characters.</td>
</tr>
<tr>
<td>Parameter label (name)</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Domain NetBIOS Name</td>
<td>example</td>
<td>The NetBIOS name of the domain (1-15 characters) for users of earlier versions of Windows.</td>
</tr>
<tr>
<td>Domain Admin User Name</td>
<td>Admin</td>
<td>The user name (5-25 alphanumeric characters) for the account that will be added as domain administrator. This is separate from the default administrator account.</td>
</tr>
<tr>
<td>Domain Admin Password</td>
<td>Requires input</td>
<td>The password for the domain administrator user. The password must be 8-32 characters, consisting of letters, numbers, and symbols.</td>
</tr>
<tr>
<td>Domain Member Security Group ID</td>
<td>Requires input</td>
<td>The ID of the domain member security group (e.g., sg-7f16e910).</td>
</tr>
</tbody>
</table>

**AWS Quick Start Configuration:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Start S3 Bucket Name</td>
<td>aws-quickstart</td>
<td>The S3 bucket you have created for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. The bucket name can include numbers, lowercase letters, uppercase letters, and hyphens (-), but should not start or end with a hyphen.</td>
</tr>
<tr>
<td>Quick Start S3 Key Prefix</td>
<td>quickstart-vfx-workstation-windows/</td>
<td>The S3 key name prefix used to simulate a folder for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. This prefix can include numbers, lowercase letters, uppercase letters, hyphens (-), and forward slashes (/).</td>
</tr>
</tbody>
</table>

**Step 4. Install the Teradici Software Client and Test the Deployment**

After you deploy the VFX host environment on AWS, install the Teradici PCoIP Software Client for Windows, connect to your remote G3 GPU instance, and start using the environment.

**Install the Teradici PCoIP software**

- Install the Teradici PCoIP Software Client by using the links you received from Teradici via email, in step 2.

**Connect to the VFX host**

1. Sign in to the AWS Management Console and open the Amazon EC2 console at [https://console.aws.amazon.com/ec2](https://console.aws.amazon.com/ec2).
2. In the left navigation pane, choose **Instances**.

3. Choose the **VFX Host** instance. Note the IPv4 public IP address, which you will enter in the next step.

4. Use your favorite Remote Desktop Protocol (RDP) client to connect remotely into the VFX host instance. Use the IPv4 public address from the VFX host instance, the user name you set for the `DomainNetBIOSName\DomainAdminUser` parameters (example `\Admin` by default), and the password you chose for the `DomainAdminPassword` parameter in step 3.

**Enable the Teradici license**

1. In the taskbar notification area, find the icon for Teradici. Open the context (right-click) menu for the icon, and choose **Licensing**.

![Figure 2: Enabling the Teradici license](image)

2. In the **Licensing** tab of the PCoIP Control Panel, type the registration code you received by email from Teradici in [step 2](#).
Connect to the VFX host from your workstation

1. On your computer, open the Teradici PCoIP Software Client, and choose **New Connection**.

2. Enter the IPv4 public address from the EC2 VFX host instance, and choose **Next**.

3. A message appears saying that Teradici cannot verify your connection. Choose **Connect Insecurely**.

   **Note** The PCoIP client generates this warning because it uses a default, self-signed Teradici certificate and can’t validate the identity of the workstation. To avoid the warning, you can [create and install your own certificate](#). For more information about Teradici connection security modes, see [Connection Security Modes](#).

4. For the user name, enter **Administrator**.

5. Use the password you decrypted earlier for the VFX host instance, and choose **Login**. You’re now connected to your remote G3 GPU instance running on AWS.

6. Install the necessary VFX software tools to do your work.
Best Practices for PCoIP on AWS

PCoIP performance depends on your network connection and proximity to the AWS Region. For more information, see the Teradici network capacity planning guidelines.

To ensure high availability of the VFX host instances, the Auto Scaling groups template creates instances in multiple Availability Zones. Sourcing objects from Amazon S3 provides a durable backup of assets that you can transfer to your instance in either Availability Zone. Your instance contains an AWS Command Line Interface (AWS CLI) that you can use to transfer objects from an existing S3 bucket. For more information, see the sync and cp commands in the AWS CLI Command Reference. To securely access your S3 bucket from the workstation, modify the vfx-stack-CloudVFXHostStack IAM role by following the instructions in this blog post on the AWS Security Blog.

Security

There are several security-related aspects of the architecture in this Quick Start. The VPC provides security using security groups and network access control lists (ACLs). This allows fine-grained control of traffic in and out of the VPC and to the host.

You should only allow access to IP addresses that use the VFX host (see the VFXHostAccessCIDR parameter in Amazon EC2 Configuration, earlier in this guide). This helps keep the host protected from malicious attacks and helps protect the data (VFX assets, in this case).

Also, keep S3 buckets secure to protect objects. You can secure them by using:

- Identity and Access Management (IAM) policies, where organizations can create and manage multiple users under a single AWS account.
- Bucket policies, where organizations define rules that apply across all requests to their Amazon S3 resources, such as granting write privileges to a subset of Amazon S3 resources.
- ACLs, where customers can grant specific permissions (such as READ, WRITE, FULL_CONTROL) to specific users for an individual bucket or object.
- Query string authentication, where customers can create a URL to an Amazon S3 object that’s valid for a limited time.

For more information, see the Amazon S3 Security FAQ. The EC2 host in this Quick Start gains access through the IAM role VFXHostRole in the template:
"VFXHostRole": {
  "Type": "AWS::IAM::Role",
  "Properties": {
    "Policies": [
      {
        "PolicyDocument": {
          "Version": "2012-10-17",
          "Statement": [
            {
              "Action": ["s3:GetObject"],
              "Resource": {
                "Fn::Sub": "arn:aws:s3:::${QSS3BucketName}/${QSS3KeyPrefix}*"
              },
              "Effect": "Allow"
            },
            {
              "Action": ["s3:ListBucket"],
              "Resource": {
                "Fn::Sub": "arn:aws:s3:::ec2-windows-nvidia-drivers"
              },
              "Effect": "Allow"
            },
            {
              "Action": ["s3:GetObject"],
              "Resource": {
                "Fn::Sub": "arn:aws:s3:::ec2-windows-nvidia-drivers/*
              },
              "Effect": "Allow"
            }
          ]
        },
        "PolicyName": "aws-quick-start-s3-policy"
      },
      "Path": "/",
      "AssumeRolePolicyDocument": {
        "Statement": [
          {
            "Action": ["sts:AssumeRole"],
            "Principal": {
              "Service": ["ec2.amazonaws.com"
            },
            "Effect": "Allow"
          }
        ],
        "Version": "2012-10-17"
      }
    ]
  }
}
The VFX host instance is in a public subnet, but you should place other hosts that don’t require public access in a private subnet for security. For example, database instances or other API endpoints gain access through Elastic Load Balancing (ELB). The NAT Gateway managed service allows private instances to access the internet or other AWS resources, but prevents the internet from initiating a connection with those instances.

**Troubleshooting**

**Q.** I encountered an error saying that **VFXHostAutoScalingGroup** was not successfully created.  

**A.** Follow these steps:  

1. Set the **Rollback on failure** option to **No**. This setting is under **Advanced** in the AWS CloudFormation console, **Options** page.  

2. Launch the Quick Start again.  

3. When the stack fails to create, go to the Amazon EC2 console, choose **Auto Scaling Groups**, and then choose the **Activity History** tab.  

4. To see the details of the error, expand the entry that contains the error.  

**Q.** I encountered a CREATE_FAILED error when I launched the Quick Start.  

**A.** If AWS CloudFormation fails to create the stack, we recommend that you relaunch the template with **Rollback on failure** set to **No**. (This setting is under **Advanced** in the AWS CloudFormation console, **Options** page.) With this setting, the stack’s state will be retained and the instance will be left running, so you can troubleshoot the issue. (Look at the log files in %ProgramFiles%\Amazon\EC2ConfigService and C:\cfn\log.)  

**Important**  When you set **Rollback on failure** to **No**, you’ll continue to incur AWS charges for this stack. Please make sure to delete the stack when you’ve finished troubleshooting.

For additional information, see [Troubleshooting AWS CloudFormation](https://aws.amazon.com) on the AWS website.

**Q.** I encountered a size limitation error when I deployed the AWS CloudFormation templates.  

**A.** We recommend that you launch the Quick Start templates from the links in this guide or from another S3 bucket. If you deploy the templates from a local copy on your computer or from a non-S3 location, you might encounter template size limitations when you create
the stack. For more information about AWS CloudFormation limits, see the AWS documentation.

GitHub Repository
You can visit our GitHub repository to download the templates and scripts for this Quick Start, to post your comments, and to share your customizations with others.

Additional Resources
AWS services
- Amazon EC2
- Amazon VPC
  https://aws.amazon.com/documentation/vpc/
- AWS CloudFormation
  https://aws.amazon.com/documentation/cloudformation/
- AWS Command Line Interface (CLI)
  https://aws.amazon.com/cli/
- NAT Gateway managed service

Teradici software
- Teradici Cloud Access Software
  https://www.teradici.com/products/cloud-access/cloud-access-software
- Teradici Sales
  sales@teradici.com

Quick Start reference deployments
- AWS Quick Start home page
  https://aws.amazon.com/quickstart/

Document Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Change</th>
<th>In sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2019</td>
<td>New licensing verbiage</td>
<td>Costs and Licenses</td>
</tr>
</tbody>
</table>