Edit in the Cloud on AWS
Implementation Guide
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Build a virtual, video editing environment on AWS using the Edit in the Cloud on AWS solution

Publication date: May 2021 (last update (p. 18): March 2022)

Edit in the Cloud on AWS helps you, the content creator, to build a virtual, video editing environment in the Amazon Web Services (AWS) Cloud. This allows you to reach your editors and creative professionals where they reside and scale up and down elastically. There is no upfront cost for high-priced GPU workstations. And the solution saves you costs associated with transferring large assets to collaborators or shipping unencrypted drives using couriers.

The solution provides the following features:

- An edit host that runs your favorite video editing software for news, sports, promotional, or post-production work.
- A shared pool of high-performance network storage so that you can collaborate with other users on projects.
- A remote streaming application so that you can access your workstation remotely and securely without having to transfer content to on-premises.

This implementation guide describes architectural considerations and configuration steps for deploying Edit in the Cloud on AWS in the AWS Cloud. It includes links to an AWS CloudFormation template that launches and configures the AWS services required to deploy this solution using AWS best practices for security and availability.

The guide is intended for DevOps teams who have practical experience architecting in the AWS Cloud.
Cost

You are responsible for the cost of the AWS services used while running this solution. The total cost will depend on your activity. This depends on how long you keep your EC2 running, how much data you transfer into AWS, and other service costs that are associated with this solution. For example, this solution does not deploy an Amazon S3 bucket; however, it allows you to configure your own S3 bucket for media file storage.

The default EC2 this solution deploys is a g4dn.4xlarge EC2 instance for running Windows. As of March 2022, the cost of running this solution with the default settings in the US East (N. Virginia) Region is $1,323.04 per month. This includes estimated charges for Amazon FSx for Windows File Server, and AWS Directory Service. To save money, consider turning off your Windows EC2 instance when not in use. Prices are subject to change. For full details, refer to the pricing webpage for each AWS service you will be using in this solution.

<table>
<thead>
<tr>
<th>AWS service</th>
<th>Quantity</th>
<th>Monthly cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS Directory Service</td>
<td><strong>Base price:</strong> Standard x 730 hours (entire month)</td>
<td>$87.60</td>
</tr>
<tr>
<td>Amazon EC2</td>
<td><strong>On-Demand pricing:</strong> G4dn.4xlarge x 160 hours (work hours only)</td>
<td>$192.64</td>
</tr>
<tr>
<td></td>
<td><strong>Outbound data transfer:</strong> 10 Mbps x 160 hours (work hours only)</td>
<td>$64.80</td>
</tr>
<tr>
<td></td>
<td>(4.5 GB x 160 hours)</td>
<td></td>
</tr>
<tr>
<td>FSx for Windows File Server</td>
<td><strong>Storage:</strong> 5 TB x $0.130 GB-month</td>
<td>$650.00</td>
</tr>
<tr>
<td></td>
<td><strong>Throughput:</strong> 16 MBps x $4.50/MBps</td>
<td>$72.00</td>
</tr>
<tr>
<td></td>
<td><strong>Backup:</strong> 5 TB x $0.050/GB</td>
<td>$256.00</td>
</tr>
<tr>
<td><strong>Total cost:</strong></td>
<td></td>
<td>$1,323.04</td>
</tr>
</tbody>
</table>
Architecture

Deploying this solution with the default parameters builds the following environment in the AWS Cloud.

Figure 1: Edit in the Cloud on AWS architecture

The AWS CloudFormation template deploys the following infrastructure:

1. An Amazon Elastic Compute Cloud (Amazon EC2) instance for Windows Server 2019 with Teradici Cloud Access Software or NICE DCV and NVIDIA T4 GPU drivers for running your Non-Linear Editor (NLE) software of choice. During deployment, the solution gives you the option to install either Teradici’s Cloud Access Software, or NICE DCV. Users can then access the cloud workstation using either Teradici’s PC-over-IP (PCoIP) client or the NICE DCV client, accordingly.

2. AWS Directory Service for user authentication.

3. Amazon FSx for Windows File Server to access digital assets via the Amazon EC2 instance through your editor of choice. FSx for Windows File Server will auto-mount the network share upon startup of the Windows Amazon EC2 instance. FSx for Windows File Server will be used for storing your media assets to be used by your non-linear editor (NLE).

Note

This solution does not deploy an Amazon S3 bucket with associated IAM roles for access. However, it allows you to configure your own S3 bucket for media file storage.
Solution components

Amazon EC2

The Amazon EC2 G4 GPU instance family used in this solution provides the latest generation NVIDIA T4 Tensor Core GPU, AWS custom Intel Cascade Lake CPUs, up to 100 Gbps of networking throughput, and up to 1.8 TB of local NVME storage. These instances are well-suited for streaming graphics-intensive applications that rely on NVIDIA GPU libraries such as CUDA.

Teradici

Using Teradici’s PC-over-IP (PCoIP) technology, you can modify content by connecting to a remote workstation, instead of transferring large files to a local machine. The Teradici client runs on your desktop or laptop and gives access to an EC2 G4dn instance.

We also recommend that you familiarize yourself with Cloud Access Software from Teradici that runs on the EC2 instance and serves up the PCoIP protocol.

NICE DCV

With NICE DCV and Amazon EC2, customers can run graphics-intensive applications remotely on EC2 instances, and stream their user interface to simple client machines, eliminating the need for expensive dedicated workstations. The NICE DCV client runs on your desktop or laptop and gives access to an EC2 G4dn instance.

We also recommend that you familiarize yourself with the NICE DCV server software that runs on the EC2 instance and serves the DCV protocol. For additional information, refer to What is NICE DCV? in the NICE DCV Administrator Guide.

Amazon FSx for Windows File Server

Amazon FSx for Windows File Server provides fully managed, highly reliable, and scalable file storage that is accessible over the industry-standard Server Message Block (SMB) protocol. It delivers a wide range of administrative features such as user quotas, end-user file restore, and Microsoft Active Directory (AD) integration. It also offers single-AZ and multi-AZ deployment options, fully managed backups, and encryption of data at rest and in transit.
Security

When you build systems on AWS infrastructure, security responsibilities are shared between you and AWS. This shared responsibility model reduces your operational burden because AWS operates, manages, and controls the components including the host operating system, the virtualization layer, and the physical security of the facilities in which the services operate. For more information about AWS security, visit AWS Cloud Security.

AWS Directory Service

This solution uses AWS Directory Service for user administration and authentication. Amazon FSx works with Microsoft Active Directory (AD) to integrate with your existing Microsoft Windows environments. Active Directory is the Microsoft directory service used to store information about objects on the network and make this information easy for administrators and users to find and use. These objects typically include shared resources such as file servers and network user and computer accounts.

IAM roles

AWS Identity and Access Management (IAM) roles allow customers to assign granular access policies and permissions to services and users on the AWS Cloud. This solution creates a role attached to the EC2 instance with least privilege, allowing access to specific S3 buckets (when applicable).

Security groups

The security groups created in this solution are designed to control and isolate network traffic between specified public IP ranges and the edit host instance. Security groups are also used to control access to Amazon FSx from the edit host. Microsoft Active Directory and Amazon FSx access is also controlled via security group access. For more information, refer to Using Amazon FSx with AWS Directory Service for Microsoft Active Directory.
Design considerations

Quotas

Before deploying the solution, you must request a vCPU limit increase based on the G4dn instance size you want to run. For details about submitting a limit increase, refer to How do I calculate an EC2 vCPU limit increase request for my On-Demand Instance?
AWS CloudFormation template

To automate deployment, this solution uses AWS CloudFormation. It includes the following CloudFormation template, which you can download before deployment:

[View template](edit-in-the-cloud-on-aws.template): Use this template to launch the solution and all associated components. The default configuration deploys Amazon Elastic Compute Cloud (Amazon EC2), Amazon FSx for Windows File Server, AWS Directory Service and AWS Lambda. You can customize the template based on your specific needs.
Automated deployment

Before you launch the solution, review the architecture, network security, other considerations discussed in this guide. Follow the step-by-step instructions in this section to configure and deploy the solution into your account.

**Time to deploy:** Approximately one hour

Deployment overview

Use the following steps to deploy this solution on AWS. For detailed instructions, follow the links for each step.

Step 1. Launch the stack (p. 8)

- Launch the AWS CloudFormation template into your AWS account.
- Enter values for required parameters: Availability Zones, Edit Host Access CIDR, Key Pair Name, and Domain Admin Password.
- Review the other template parameters, and adjust if necessary.

Step 2. (Optional) Add Teradici license to the EC2 instance (p. 11)

If you have chosen to deploy the instance using Teradici’s Cloud Access Software, you must obtain a license for this software from Teradici. To apply for the license, follow these high-level steps:

- Obtain the EC2 IP address.
- Activate the Teradici license.

Step 3. Mount the NVMe Disk (p. 13)

- Use Windows PowerShell terminal to mount the NVMe Disk.

Step 4. Load data from Amazon S3 (p. 13)

- Use Windows PowerShell terminal to load data from Amazon S3.

Step 1. Launch the stack

This automated AWS CloudFormation deploys the solution in the AWS Cloud.

**Note**

You are responsible for the cost of the AWS services used while running this solution. For more details, visit the Cost (p. 2) section in this guide, and refer to the pricing webpage for each AWS service used in this solution.

1. Sign in to the AWS Management Console and select the button to launch the edit-in-the-cloud-on-aws AWS CloudFormation template.
Alternatively, you can download the template as a starting point for your own implementation.

2. The template launches in the US East (N. Virginia) Region by default. To launch the solution in a different AWS Region, use the Region selector in the console navigation bar.

3. On the Create stack page, verify that the correct template URL is in the Amazon S3 URL text box and choose Next.

4. On the Specify stack details page, assign a name to your solution stack. For information about naming character limitations, refer to IAM and STS Limits in the AWS Identity and Access Management User Guide.

5. Under Parameters, review the parameters for this solution template and modify them as necessary. This solution uses the following default values.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Configuration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability Zones</td>
<td>&lt;Requires input&gt;</td>
<td>Select two Availability Zones to use for the VPC subnets. The template presents all Availability Zones available, select two.</td>
</tr>
<tr>
<td>VPC CIDR</td>
<td>10.0.0.0/16</td>
<td>CIDR block for the VPC that contains the Windows EC2 instance.</td>
</tr>
<tr>
<td>Private Subnet 1 CIDR</td>
<td>10.0.0.0/19</td>
<td>CIDR block for private subnet 1 located in Availability Zone 1.</td>
</tr>
<tr>
<td>Private Subnet 2 CIDR</td>
<td>10.0.32.0/19</td>
<td>CIDR block for private subnet 2 located in Availability Zone 2.</td>
</tr>
<tr>
<td>Public Subnet 1 CIDR</td>
<td>10.0.128.0/20</td>
<td>CIDR block for the public DMZ subnet 1 located in Availability Zone 1.</td>
</tr>
<tr>
<td>Public Subnet 2 CIDR</td>
<td>10.0.144.0/20</td>
<td>CIDR block for the public DMZ subnet 2 located in Availability Zone 2.</td>
</tr>
<tr>
<td>Amazon EC2 Configuration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amazon EC2 instance type</td>
<td>g4dn.4xlarge</td>
<td>The Amazon EC2 instance type for the video editing servers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> You can change the size of the EC2 instance that you can use for editing; however, the majority of the price is based on the size of the EC2 instance that you select here.</td>
</tr>
</tbody>
</table>
## Edit in the Cloud on AWS Implementation Guide

### Step 1. Launch the stack

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Edit Host Access CIDR</strong></td>
<td>&lt;Requires input&gt;</td>
<td>The CIDR block that is used for the security group on your Amazon EC2 instance editing host. <strong>Note:</strong> Use a website such as, <a href="https://checkip.amazonaws.com">https://checkip.amazonaws.com</a> to determine your public facing IP address for this step.</td>
</tr>
<tr>
<td><strong>Key Pair Name</strong></td>
<td>&lt;Requires input&gt;</td>
<td>The PEM key that allows you to securely connect to your EC2 instance after it launches. You can create a PEM key in the Amazon EC2 console.</td>
</tr>
<tr>
<td><strong>Remote Display Protocol</strong></td>
<td>teradici</td>
<td>The remote display protocol to configure on the instance for remote access. Select either teradici or nicedcv.</td>
</tr>
<tr>
<td><strong>Microsoft Active Directory Configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domain DNS Name</td>
<td>example.com</td>
<td>Fully qualified domain name (FQDN) of the forest root domain.</td>
</tr>
<tr>
<td>Domain NetBIOS Name</td>
<td>example</td>
<td>NetBIOS name of the domain (up to 15 characters) for users of earlier versions of Windows.</td>
</tr>
<tr>
<td>Domain Admin User</td>
<td>Admin</td>
<td>User name 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>&lt;Requires input&gt;</td>
<td>Password for the Domain Administrator user. Must be at least 8 characters containing letters, numbers, and symbols.</td>
</tr>
<tr>
<td><strong>FSx Configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSx File System Size</td>
<td>1024</td>
<td>The storage capacity of the file system being created. 32 GiB - 65,536 GiB (64 TiB)</td>
</tr>
</tbody>
</table>
Edit in the Cloud on AWS Implementation Guide
Step 2. Add Teradici license to the EC2 instance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSx Throughput</td>
<td>16</td>
<td>The throughput capacity of an Amazon FSx file system, measured in megabytes per second in powers of 2 (8, 16, 32, .., 1024), with the recommended value based on the file system size: 8 for &lt;800 GiB, 16 for &lt;1,600 GiB, ... 512 for &lt;51,200 GiB, 1,024 for &gt;=51,200 GiB</td>
</tr>
<tr>
<td>FSx AZ Deployment Mode</td>
<td>SINGLE_AZ_2</td>
<td>Specifies the file system deployment type.</td>
</tr>
<tr>
<td>Other Parameters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>aws-edit-in-the-cloud</td>
<td>Used for billing and resource groups.</td>
</tr>
</tbody>
</table>

6. Choose Next.
7. On the Configure stack options page, choose Next.
8. On the Review page, review and confirm the settings. Check the boxes acknowledging that the template will create AWS Identity and Access Management (IAM) resources.
9. Choose Create stack to deploy the stack.

You can view the status of the stack in the AWS CloudFormation Console in the Status column. You should receive a CREATE_COMPLETE status in approximately one hour.

Note
This solution includes the custom-resource AWS Lambda function, which runs only during initial configuration or when resources are updated or deleted. Do not delete this function because it is necessary to manage associated resources.

Step 2. (Optional) Add Teradici license to the EC2 instance

If you have chosen to deploy your instance with NICE DCV as the Remote Desktop Protocol, skip this step and move to the section called “Step 3. Mount the NVMe disk” (p. 13).

If you have chosen to deploy your instance with Teradici Cloud Access Software, you must purchase a software license from Teradici and install it on the instance after deployment.

After the stack deploys, use Windows Remote Desktop to add a Teradici license to the EC2 instance. First, obtain the public IP address of the EC2 edit host.

Obtain the EC2 IP address

1. Navigate to the Amazon Elastic Compute Cloud console.
2. In the navigation pane, choose Instances.
3. Select the win-host EC2 instance
4. On the Networking tab, copy the value for Public IPv4 address.
Windows connection steps

1. Open Remote Desktop. If you can’t find it, choose Start, enter MSTSC, and press Enter.
2. When prompted, enter the IP address of the edit host and choose Connect.
3. When prompted, enter the username and password. The username is the value that you entered for the Domain Admin User parameter (Admin by default). The password is the value that you entered for the Domain Admin Password parameter when launching the stack.

MacOS connection steps

If you use MacOS, you must download the Microsoft Remote Desktop Client from the App Store.

1. Open Microsoft Remote Desktop.
2. Select the + icon, then select Add PC.
3. For PC Name, enter the IP address of the edit host. You can specify a friendly name for easy reference, such as Edit Host.
4. Choose Add.
5. When the new PC appears in your connection options, select it to connect to the EC2 instance.
6. When prompted, enter the username and password. The username is the value that you entered for the Domain Admin User parameter (Admin by default). The password is the value that you entered for the Domain Admin Password parameter when launching the stack.

Activate the Teradici license

In order to use Teradici, you must purchase a license first.

1. Select the Teradici icon (refer to Figure 2), and choose Licensing.

   ![Figure 2: Teradici icon](image)

   2. In the PCoIP Control Panel box, enter your registration code, and choose Register.

Connect to the edit host

After activating your Teradici license, connect to the edit host using a Teradici PCoIP Client.
Step 3. Mount the NVMe disk

In this deployment, we will mount ephemeral storage to the edit host for a scratch media edit space. Ephemeral storage provides low-latency to the host as it is physically attached storage.

**Important**

Any assets stored on this volume will be lost upon edit host reboot or termination. We recommend saving all project assets to the FSx file share.

1. Open Windows Powershell terminal:
   a. Choose **Start**.
   b. Enter “powershell” in the Search bar.
   c. Right click the Windows Powershell icon and choose **Run as Administrator**.
   d. If prompted with an alert to allow Windows Powershell to make changes on your device, select **Yes**.

2. In the Windows Powershell terminal, enter the following Powershell command to change to the correct directory:

   ```powershell
cd C:\ProgramData\Amazon\EC2-Windows\Launch\Scripts
   ```

3. Enter the following Powershell command to mount the NVMe disk:

   ```powershell
   .\InitializeDisks.ps1
   ```

The FSx file share mounts to the F drive upon user sign in.

Step 4. (Optional) Load data from Amazon S3

Follow these steps to move your media assets from Amazon S3 to Amazon FSx for Windows File Server.

1. Choose **Start**.
2. Enter “powershell” in the Search bar.
3. Select **Windows Powershell for AWS**.
4. Change to the FSx File Share drive mapping:

   F:

5. Create a new directory for media:

   ```bash
   mkdir Media
   ```

6. Use the following command to list the contents of your S3 bucket:

   ```bash
   aws s3 ls s3://<bucket-name>
   ```
7. Use the following command to load the data from your S3 Bucket into the FSx File Share. `<key-prefix>` is any folder or object you want to load into the file share.

```
aws s3 sync s3://<bucket-name>/<key-prefix> .\Media\n```

**To verify that your files were synchronized from S3 to the FSx file share**

1. Navigate to your Windows File Explorer, then to your FSx File Share, which is mounted to the F: Drive.
2. From your file share, verify that the Media folder is there.
3. Open the Media folder and check that the contents of your S3 Bucket have synchronized.
Additional resources

AWS services

- AWS CloudFormation
- AWS EC2
- FSx for Windows File Server
- AWS Directory Service
- Amazon S3
- NICE DCV

Blog posts

- Deploying your favorite post-production applications on AWS Virtual Desktop infrastructure
- Getting started with AWS cloud video editing
Uninstall the solution

To uninstall this solution, you must delete the CloudFormation stack. If you added additional resources, such as an Amazon S3 bucket, you must delete these manually.

Using the AWS Management Console

1. Sign in to the AWS CloudFormation console.
2. Select this solution’s installation stack.
3. Choose **Delete**.

Using AWS Command Line Interface

Determine whether the AWS Command Line Interface (AWS CLI) is available in your environment. For installation instructions, refer to **What Is the AWS Command Line Interface** in the **AWS CLI User Guide**. After confirming that the AWS CLI is available, run the following command.

```
$ aws cloudformation delete-stack --stack-name <installation-stack-name>
```
Source code

Visit our solution GitHub repository to download the source files for this solution and to share your customizations with others. Refer to the README.md file for additional information.
## Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2021</td>
<td>Initial release</td>
</tr>
<tr>
<td>June 2021</td>
<td>Release v1.0.1: bug fix. For more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>August 2021</td>
<td>Release v2.0.0: Changed the default value of a field in the Active Directory sub-template to save cost. For more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>January 2022</td>
<td>Release v2.1.0: Added an option to install NICE DCV as the Remote Desktop Protocol on the EC2 instance as an alternative to the existing support for Teradici Cloud Access Software. For more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>March 2022</td>
<td>Release v2.1.1: bug fixes. For more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>March 2022</td>
<td>Release v2.2.0: Reinstated Teradici CAS. For more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
</tbody>
</table>
Contributors

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- Eddie Goynes
- Brandon Dold
- Mark Stephens
- Matt Herson
- Alastair Cousins
Notices

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AWS glossary

For the latest AWS terminology, see the AWS glossary in the AWS General Reference.