Amazon AppStream 2.0: Getting Started Guide

Build an Amazon AppStream 2.0 environment to stream desktop applications to your users

April 2018

https://aws.amazon.com/appstream2/
Welcome

This guide describes how to deploy and stream desktop applications for your company (in this example, DemoCo) by using Amazon AppStream 2.0, a fully managed, secure application streaming service that runs in the AWS Cloud.

What you’ll accomplish:

- Provision an Amazon virtual private cloud (Amazon VPC) to provide an isolated virtual network infrastructure within the AWS Cloud. Your AppStream 2.0 resources will use this environment.

- Use the AWS Management Console to perform the basic administrative tasks required to build an AppStream 2.0 environment. Specifically, you’ll:
  
  1. Install and configure two desktop applications for streaming using an image builder.

  2. Provision a fleet of instances to stream your applications. The fleet will use the Standard instance type and adhere to scaling policies to match the number of users that you want to be able to stream concurrently.

  3. Provision a stack to create a web portal from which users can stream your applications.

  4. Configure persistent storage that users can access across application streaming sessions.

  5. Create a user pool to manage users who access your streaming applications.

What you need before starting:

- **An AWS account:** You need an AWS account to use AppStream 2.0 and other AWS services. For information about how to sign up for and activate an AWS account, see Appendix A.

- **A current email address:** During the user configuration process for your AppStream 2.0 environment, AWS sends you two emails. You must use these emails to complete the process.
• **Skill level:** You do not need prior experience with AWS to complete these exercises. A basic understanding of desktop computing is helpful but not required.
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Choose an AWS Support plan ....................................................... 44
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Step 1. Sign in to the AWS Management Console and select an AWS Region

If you do not have an AWS account, you must first complete the steps in Appendix A.


2. Type your email address or your AWS account ID, and choose Next.

3. Type your AWS account password, and choose Sign In.

4. In the menu in the upper right corner of the console, select the AWS Region for your environment. AWS currently hosts services in 18 different geographical areas.

5. Select one of the following seven Regions in which AppStream 2.0 is available:

Step 2: Create network resources

In this section, you will create an Amazon virtual private cloud (VPC) and other network resources required for your AppStream 2.0 environment. The following steps use a
template in AWS CloudFormation to automatically create and configure the necessary network resources. To manually create and configure network resources, see Appendix B.

1. Make sure that you are signed in to the AWS Management Console.

2. In the following list of regional choices, open the link associated with the AWS Region in which you want to build your AppStream 2.0 environment.

   - US East (N. Virginia)
   - US West (Oregon)
   - EU (Frankfurt)
   - EU (Ireland)
   - Asia Pacific (Singapore)
   - Asia Pacific (Sydney)
   - Asia Pacific (Tokyo)

   The AWS CloudFormation console displays the URL of a template that is used to create your network resources and the name of the resulting AWS CloudFormation stack.

3. In the bottom right corner of the window, choose Create. AWS CloudFormation starts creating the resources and displays a status message to indicate progress.
4. When the creation process completes, usually within five minutes, the AWS CloudFormation console displays the status **CREATE_COMPLETE**.


6. In the navigation pane, under **Virtual Private Cloud**, choose **Your VPCs**. In the list of VPCs, you should see the following VPC that was automatically created:

   ![Figure 3: VPC created by AWS CloudFormation.](image)

   **Note:** The VPC ID value will differ for your VPC.

7. In the navigation pane, under **Virtual Private Cloud**, choose **Subnets**. In the list of subnets, you should see the following subnets that were automatically created:
Figure 4: Subnets created by AWS CloudFormation.

Note: The Subnet ID and VPC values will differ for your subnets.

8. You have now successfully created your network resources by using AWS CloudFormation. You can proceed to Step 3.

Step 3: Create an AppStream 2.0 image builder

AppStream 2.0 uses EC2 instances to stream applications. You launch instances from base images, called *image builders*, which AppStream 2.0 provides. To create your own custom image, you connect to an image builder instance, install and configure your applications for streaming, and then create your image by creating a snapshot of the image builder instance.

To install and configure applications to stream to your users, you must create an image builder instance as described in the following procedure.

Deploy an image builder instance to install applications


2. If you have not previously configured any AppStream 2.0 settings, the following page appears:
Figure 5: The AppStream 2.0 first experience page.

**Note:** If the AppStream 2.0 navigation page appears instead, skip to step 5.

3. Choose **Get started**.

4. In the lower right corner of the page, choose **Skip** (this guide walks you through a different process for getting started with AppStream 2.0).

Figure 6: AppStream 2.0 getting started options.

5. In the navigation pane, choose **Images, Image Builder, Launch Image Builder**.

6. In the **Step 1: Choose Image** window, in the list of images, select the image builder with the name **Base-Image-Builder-mm-dd-yyyy**, where **mm-dd-yyyy** represents the most recent date. Base images include the latest updates to
Microsoft Windows and the AppStream 2.0 agent software. You use this base image to create a custom image that includes your own applications.

![Launch an AppStream 2.0 Image Builder](image)

**Figure 7: Choosing an image builder.**

7. At the bottom of the page, choose **Next**.

8. In **Step 2: Configure Image Builder**, the following image builder configuration options are displayed:
9. Type the following information and then choose **Review**.

### Configure image builder fields

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Provide a unique name identifier for the image builder, such as <code>DemoCo_Image_v1_mmddyyyy</code>, using any of the following characters: a-Z,0–9,-,_.</td>
</tr>
<tr>
<td>Display Name</td>
<td>Provide an optional name, such as <code>DemoCo Image v1 April 2018</code>, to be displayed in the console for easier reference and readability.</td>
</tr>
<tr>
<td>Instance Type</td>
<td>Accept the default value <code>General Purpose</code>.</td>
</tr>
<tr>
<td>Instance Family</td>
<td>Select <code>stream.standard.medium</code> from the list of available instance types.</td>
</tr>
</tbody>
</table>

Choose **Next** to continue to **Step 3: Configure Network** and then type the following information:

- **Default Internet Access**: Make sure that this option is not selected.
- **VPC**: Select the option corresponding to `AppStream 2 VPC`.  

*Figure 8: Image builder configuration options.*
<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subnet</td>
<td>Select the subnet with the IP address range 10.0.1.0/24 (AppStream2 Private Subnet1).</td>
</tr>
<tr>
<td>Security group(s)</td>
<td>Accept the default security group listed.</td>
</tr>
<tr>
<td><strong>Active Directory Domain</strong></td>
<td><strong>Do not</strong> configure any options.</td>
</tr>
<tr>
<td>(Optional)</td>
<td></td>
</tr>
</tbody>
</table>

10. Choose **Review**, and confirm the details for the image builder. To change the configuration for any section, choose **Edit** and make your changes.

11. After you finish reviewing the configuration details, choose **Launch**. If an error message notifies you that you don’t have sufficient limits to create the image builder, submit a limit increase request through the AWS Support Center. For more information, see **AWS Service Limits**.

12. The image builder creation process takes about 15 minutes to complete. During this process, the status of the image builder displays as **Pending** while AppStream 2.0 provisions the necessary resources.

13. Click the **Refresh** icon periodically to update the image builder status. After the status changes to **Running**, the image builder is ready to use and you can create a custom image.

   **Note:** Charges accrue for an image builder instance while it is running, even if no user is actively connected. You can stop or delete the image builder at any time. No user fees are incurred when users connect to an image builder. For more information, see **AppStream 2.0 Pricing**.

**Step 4: Connect to the image builder and install applications**

Now that you have provisioned an image builder, you can use it to install and configure the applications to stream to users. First, you must establish a remote connection to the instance to install and configure your applications.

**Connect to the image builder instance**

2. In the navigation pane, choose **Images, Image Builder**.

3. Select the image builder instance that you created earlier *(DemoCo_Image1_mmddyyyy)*. Verify that its status is **Running** and choose **Connect**.

![Image Builder Instance](image)

*Figure 9: Choosing an image builder instance.*

**Note:** If the status is **Stopped**, select the instance, and choose **Actions, Start**. Click the **Refresh** icon periodically to update the instance list until the status is **Running**.

4. The new browser tab opens, displaying options for logging into the image builder instance. Choose **Local User, Administrator**.

![Login Options](image)

*Figure 10: The image builder instance login options window.*

**Note:** If a new browser tab does not open, configure your browser to allow pop-ups from https://console.aws.amazon.com/.

5. After a few moments, you are connected to the image builder instance with administrator rights.
Download application installation files to your image builder instance

In this exercise, you use a browser to download and install the following two applications:

- Google Chrome Browser for enterprise:  
  https://enterprise.google.com/chrome/chrome-browser/

- Notepad++:  
  https://notepad-plus-plus.org/

1. Launch Mozilla Firefox by opening the Firefox icon on the image builder instance desktop.
   - If prompted by the Firefox Import Wizard, choose Don’t import anything, Next.
   - If prompted to sign in to Firefox, choose Skip this step.
   - If Firefox displays a notification that the application is out of date, close the notification.
   - If prompted to set a default browser, choose Use Firefox as my default browser.
   - If prompted by Windows to decide how to open HTTP links, choose the Firefox icon.

2. Open Firefox and navigate to the following URL to download the full Chrome browser installer:  
   https://enterprise.google.com/chrome/chrome-browser/.

3. In the webpage that opens, download the Chrome MSI for Windows 64-bit.

Figure 11: Downloading Chrome by using Firefox.
4. Using Firefox, navigate to the following URL to download the Notepad++ installer: https://notepad-plus-plus.org/.

5. In the navigation pane, open the **download** link.

6. In the webpage that opens, scroll to the section **Download 64-bit x64**.

   ![Download Notepad++](https://notepad-plus-plus.org/download/v7.3.3.html)

   *Figure 12: Downloading Notepad++.*

7. Download **Notepad++ Installer 64-bit x64**.

8. When prompted, choose **Save File**. The Notepad++ installer is saved to the Downloads folder.

9. Close Firefox, and if prompted, choose **Close tabs**.

**Install the applications**

1. Open File Explorer by clicking the folder icon on the taskbar.

2. Select the **Downloads** folder to open it. The Chrome and Notepad++ installer files that you downloaded should be listed.
3. To install Chrome, open the file `googlechromestandaloneenterprise64.msi`. If prompted by a security warning, choose Run.

   **Note:** Chrome includes an automated update process. For information about disabling that process so that users aren’t exposed to it, see Appendix C.

4. Open Chrome and verify that it functions correctly.

5. To install Notepad++, open the file `npp.x.x.x.Installer.x64.exe`.

6. Choose the default values, and when prompted, choose **Finish** to complete the installation.

   **Note:** For information about installing Notepad++, see Appendix D.

7. After the installation completes, close File Explorer.

8. Open Notepad++ and verify that it functions correctly.

You have now installed, configured, and validated the applications to stream to your users.

**Step 5: Use Image Assistant to create an AppStream 2.0 image**

At this point, you have launched an image builder instance and installed two applications, Chrome and Notepad++, on the image builder. Now you'll prepare the
applications for streaming, optimize them for streaming performance, and create your image.

In this section, you’ll do the following:

- Create an application catalog by using Image Assistant.
- Test the applications by using a local user account that has the same permissions that end users will have in their streaming sessions.
- Optimize the applications’ launch performance.
- Configure the image.
- Finish creating the image.

Create your AppStream 2.0 application catalog
The process of creating an AppStream 2.0 application catalog includes specifying the name, display name, executable file to launch, and icon to display for each application that you plan to stream.

1. From the image builder desktop, open Image Assistant.

2. In the Add Applications to Image dialog box, on the Add Apps tab, choose Add Application.

![Add Applications to Image dialog box in Image Assistant.](image)

*Figure 14: The Add Applications to Image dialog box in Image Assistant.*
3. Navigate to the location of the Chrome executable file (C:\Program Files (x86)\Google\Chrome\Application), select the chrome.exe file, and then choose **Open**.

4. In **Edit Application Setting**, type the following information and choose **Save**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>Chrome_x64_vW.X.Y.Z (where W.X.Y.Z matches the version number of the Chrome installer)</td>
</tr>
<tr>
<td><strong>Display Name</strong></td>
<td>The name of the application that is displayed to end users. Type <em>Chrome</em>.</td>
</tr>
<tr>
<td><strong>Launch Path</strong></td>
<td>The location of your application executable file. Accept the default value of C:\Program Files (x86)\Google\Chrome\Application\chrome.exe.</td>
</tr>
<tr>
<td><strong>Icon Path</strong></td>
<td>Accept the default value of C:\ProgramData\Amazon\Photon\AppCatalogHelper...</td>
</tr>
<tr>
<td><strong>Launch Parameters</strong></td>
<td>Command-line arguments that can be passed to the application at launch. Type the following text: --make-default-browser-for-user --no-first-run <a href="http://aws.amazon.com">http://aws.amazon.com</a></td>
</tr>
<tr>
<td><strong>Working Directory</strong></td>
<td>Leave this blank.</td>
</tr>
</tbody>
</table>

The **Edit Application Setting** dialog box should display as follows:
5. On the **Add Apps** tab, choose **Add Application** to add the second application to stream, Notepad++.

6. Navigate to the location of the Notepad++ installation (for example, C:\Program Files\Notepad++), select the notepad++.exe file, and then choose **Open**.

7. In **Edit Application Setting**, type the following information and choose **Save**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>Notepad++ _x64_vX.Y.Z (where X.Y.Z matches the version number of the Notepad++ installation file)</td>
</tr>
<tr>
<td><strong>Display Name</strong></td>
<td>Notepad++</td>
</tr>
<tr>
<td><strong>Launch Path</strong></td>
<td>Accept the default value of C:\Program Files\Notepad++\notepad++.exe.</td>
</tr>
<tr>
<td><strong>Icon Path</strong></td>
<td>Accept the default value of C:\ProgramData\Amazon\Photon\AppCatalog...</td>
</tr>
<tr>
<td>Option</td>
<td>Value</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Launch Parameters</td>
<td>Leave this blank.</td>
</tr>
<tr>
<td>Working Directory</td>
<td>Leave this blank.</td>
</tr>
</tbody>
</table>

The **Edit Application Setting** dialog box should display as follows:

![Edit Application Setting dialog box](image)

*Figure 16: Settings for the Notepad++ application.*
Both applications should display in the **Add Apps** tab as follows:

![Add Applications to Image window](image)

*Figure 17: The Chrome and Notepad++ applications displayed on the Add Apps tab.*

8. Now that you have added both applications, choose **Next**.

**Test your applications by using a local user account**

An image builder includes a test user account that enables you to test your applications by using the same policies and permissions as your users. Follow these steps to confirm that your applications open correctly.

1. In the Test tab, choose **Switch User, Test User**.

   You are now logged into the same Windows Server 2012 R2 instance as a local user who has regular (non-administrative) user rights.
2. Open Image Assistant. In **Test Applications**, the two applications that you added are displayed.

![Figure 18: The Chrome and Notepad++ applications displayed in the Test Applications dialog box.](image)

3. Choose the first application, Chrome, to open it.

   **Note:** You must open the application from the **Test Applications** dialog box and not from the desktop or **Start** menu.

4. After Chrome completely opens and loads the Amazon Web Services website, close the browser.

5. In the **Test Applications** window, open the second application, Notepad++.

6. After Notepad++ opens and starts completely, close it. If prompted, choose **Ok** to close the application.

   The application test verification is now complete.

7. Choose **Switch User**.

8. On the **Local User** tab, choose **Administrator**.

9. On the Image Assistant **Test** tab, choose **Next**.
Optimize the launch performance of your applications

During this step, Image Assistant opens your applications one after another, identifies their launch dependencies, and performs optimizations to ensure that applications launch quickly.

1. On the **Optimize** tab, choose **Chrome, Launch**.

![Image of the Optimize tab with Chrome selected for launch](image)

*Figure 19: The Chrome application selected for launch on the Optimize tab.*

2. When the Chrome browser opens, the default homepage is set to [http://aws.amazon.com](http://aws.amazon.com), which indicates that the application is correctly configured.

3. Wait for Chrome to completely start, as prompted by a message in the application.

4. After you complete the first run experience for the application and verify that it functions as expected, choose **Continue**. The second application, Notepad++, opens automatically.

5. After the application launch is complete, choose **Continue**.

**Configure the image**

1. On the **Configure Image** tab, type the following information.
<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The unique name identifier for the image, such as DemoCo_Image_Chrome_Notepad_v1_mmdyyyyy, using any of the following characters: a-Z,0–9,-,_. Note: The name cannot begin with &quot;Amazon,&quot; &quot;AWS,&quot; or &quot;AppStream.&quot;</td>
</tr>
<tr>
<td>Display Name</td>
<td>A user-friendly name to display in the console, such as DemoCo Chrome and Notepad++ Image v1 mm/dd/yyyy</td>
</tr>
<tr>
<td>Description</td>
<td>An optional description for the image: for example, Image v1 created by (your initials or name) on mm/dd/20yy. Apps include Chrome Enterprise x64 vWW.XX.YYYY.ZZZ and Notepad++ vX.Y.Z</td>
</tr>
<tr>
<td>Always use latest agent version</td>
<td>Leave this check box selected so that streaming instances that are launched from your image always include the latest AppStream 2.0 features, performance improvements, and security updates. For more information, see Amazon AppStream 2.0 Agent Version History.</td>
</tr>
</tbody>
</table>

2. On the **Configure Image** tab, the image details should display as follows. Choose **Next**.
Finish creating the image

Complete the following steps to disconnect from the remote session and start the image creation process.

1. Review the image details, and choose **Disconnect and Create Image**.

2. The remote session disconnects within a few moments. When the **Lost Connectivity** message appears, close the browser tab.

3. Return to the [Amazon AppStream 2.0 console](https://console.aws.amazon.com/appstream) and choose **Images**, **Image Registry**. While your image is being created, the image status in the image registry of the console appears as **Pending**. While your image is being created, you cannot connect to it.

4. Click the **Refresh** icon periodically to update the status. Image creation takes about 20 minutes. After your image is created, the image status changes to **Available** and the image builder is automatically stopped.

**Note:** To make changes to your image, such as adding other applications or updating existing applications, you must create a new image. To do so, restart and reconnect to the image builder, make your changes, and then repeat the Image Assistant process to create a new image that includes the changes.
Step 6: Provision a fleet

An AppStream 2.0 fleet defines the hardware, network, Active Directory (if applicable), and scaling configuration for your application streaming infrastructure. For more information, see Amazon AppStream 2.0 Stacks and Fleets.

In this section, you’ll do the following:

- Provide details for your fleet.
- Choose an image.
- Configure the fleet.
- Configure the network.

Provide fleet details


2. In the navigation pane, choose Fleets, Create Fleet.

3. For Step 1: Provide Fleet Details, type the following text and choose Next.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The unique name identifier for the fleet, such as DemoCo_Fleet_v1_mmddyyyy, using any of the following characters: a-Z,0–9,-,._,.</td>
</tr>
<tr>
<td></td>
<td>Note: The name cannot begin with &quot;Amazon,&quot; &quot;AWS,&quot; or &quot;AppStream.&quot;</td>
</tr>
<tr>
<td>Display Name</td>
<td>The name displayed in the console, such as DemoCo Fleet v1 April 2018.</td>
</tr>
<tr>
<td>Description</td>
<td>An optional description for the fleet. For example, Fleet v1 created by (your initials or name) on mm/dd/20yy. Built using the DemoCo_Image_Chrome_Notepad_v1_mmdd20yy image. Apps include AWS URL on Chrome Enterprise x64 vWW.XX.YYYY.ZZZ and Notepad++ vX.Y.Z.</td>
</tr>
</tbody>
</table>
Choose an image

For Step 2: Choose an image, choose the image that you created, scroll to the bottom of the page, and then choose Next.

![Image of Choose an Image screen](image)

*Figure 22: The DemoCo_Image image that the fleet uses to stream applications.*

Configure the fleet

1. For Step 3: Configure fleet, in Choose instance type, you define the hardware configuration for each of the instances that make up your fleet. Because you created the image by using the General Purpose family, the instance type is already populated. However, you can select any of the three instance type options that are presented.

![Image of Choose instance type](image)

*Figure 23: The Choose instance type section of the Configure fleet page.*

2. For this exercise, leave the General Purpose instance type selected, and then choose stream.standard.medium. For more information, see Amazon AppStream 2.0 Instance Families.
3. Under **Fleet Type details**, choose a fleet type that suits your needs. The fleet type determines the availability of streaming instances and affects your costs. You can choose either of the following:

- **Always-on**: Instances run all the time, even when no users are streaming applications. When this option is selected, instances are immediately available for the next user to connect to immediately.

- **On-Demand**: Instances run only when users are streaming applications. Idle instances that are available for streaming are in a stopped state. When this option is selected, a user must wait for one to two minutes for an instance to start up.

For this exercise, select the **On-Demand** option.

4. Under **User session details**, define the maximum amount of time that users can be connected to streaming sessions and how long streaming sessions should remain active after users disconnect.

   - **Maximum session duration** defines how long user streaming sessions can remain active. If users are still connected to a streaming session five minutes before this limit is reached, they are prompted to save any open documents before being disconnected. Choose **8 hours**.

   - **Disconnect timeout** defines how long user streaming sessions can remain active after users are disconnected. If users try to reconnect to the streaming session after a disconnection or network interruption within this time interval, they are connected to the previous session. After the disconnect timeout expires, the session is terminated, and the user must start a new session to reconnect. Leave the default setting of **15 minutes**.

5. Under **Fleet capacity**, set **Minimum capacity** to 2 and **Maximum Capacity** to 4.

**Notes:**

- Capacity is defined in terms of the number of instances within a fleet and, consequently, every unique user streaming session that is served by a separate instance.
- The minimum capacity for your fleet is the minimum number of users who are expected to be streaming at the same time.

- The maximum capacity for your fleet is the maximum number of users who are expected to be streaming at the same time.

6. Choose Next.

Configure the network

1. For Step 4: Configure Network, make sure that the Default Internet Access check box is not selected. This option does not need to be selected because you already configured a VPC with a NAT gateway to provide internet access.

2. For VPC, select vpc-xxxxxxxx (AppStream2 VPC).

3. For Subnet 1, choose subnet-xxxxxxxx | (10.0.1.0/24). This is the AppStream2 Private Subnet1.

4. For Subnet 2, choose subnet-xxxxxxxx | (10.0.2.0/24). This is the AppStream2 Private Subnet2.

5. Choose Next.

6. Confirm the fleet configuration details. To change settings for any section, choose Edit, and make the needed changes. After you finish reviewing the configuration details, choose Create.

7. In the pricing acknowledgement dialog box, select the acknowledgement check box, and choose Create to begin provisioning your fleet with the initial set of running instances.
Figure 24: The AppStream 2.0 streaming instance pricing acknowledgement dialog box.

**Note:** If an error message notifies you that you don’t have sufficient limits to create the fleet, submit a limit increase request to the AWS Support Center. For more information, see [Amazon AppStream 2.0 Service Limits](#).

Fleet provisioning usually takes 10 minutes to finish. While your fleet is being created and fleet instances are provisioned, the status of your fleet displays as **Starting** in the **Fleets** list. Choose the **Refresh** icon periodically to update the fleet status until the status is **Running**.

8. After the status changes to **Running**, the fleet is available and you can use it to create a stack.

**Step 7: Create an AppStream 2.0 stack and a streaming URL**

An AppStream 2.0 stack consists of a fleet, user access policies, and storage configurations. You create a stack to start streaming applications to users.

In this section, you’ll do the following:

- Provide details for your stack and associate your stack with a fleet.
- Enable persistent storage for the stack.
- Create a streaming URL.
Provide stack details and associate the stack with a fleet


2. In the navigation pane, choose **Stacks, Create Stack**.

3. For **Step 1: Stack Details**, type the following information and choose **Next**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>The unique name identifier for the stack, such as DemoCo_Stack_mmddyyyy, using any of the following characters: a-Z,0–9,-,__. Note: The name cannot begin with &quot;Amazon,&quot; &quot;AWS,&quot; or &quot;AppStream.&quot;</td>
</tr>
<tr>
<td><strong>Display Name</strong></td>
<td>The name displayed in the console, such as <strong>DemoCo Stack April 2018</strong>.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>An optional text box where you can enter details of the stack: for example <strong>Stack v1 created by (your initials or name) on mm/dd/20yy.</strong></td>
</tr>
<tr>
<td></td>
<td>Leverages the DemoCo_Fleet_v1_mmdd20yy fleet built using the DemoCo_Image_Chrome_Notepad_v1_mmdd20yy image. <strong>Apps include Chrome Enterprise x64 vWW.XX.YYY.ZZZ and Notepad++ vX.Y.Z.</strong></td>
</tr>
<tr>
<td><strong>Redirect URL</strong></td>
<td>An optional URL to which users are redirected at the end of their streaming session. Type: <a href="https://aws.amazon.com">https://aws.amazon.com</a></td>
</tr>
<tr>
<td><strong>Fleet</strong></td>
<td>Select the DemoCo_Fleet_v1_mmddyyyy fleet that you created.</td>
</tr>
</tbody>
</table>

Enable persistent storage for the stack

1. For **Step 2: Enable Storage**, make sure that the **Enable Home Folders** option is selected. When this option is selected for an AppStream 2.0 stack, users of the stack are presented with a persistent storage folder in their AppStream 2.0.
sessions. Data stored by users in their Home Folders is backed up to an Amazon S3 bucket that is automatically created in your AWS account. For more information, see Persistent Storage with AppStream 2.0 Home Folders.

![Enable Home Folders page](image)

*Figure 25: The Enable Home Folders page, displaying the Amazon S3 bucket that is automatically created.*

2. Choose Review.

3. Confirm the stack configuration details. To change the settings for any section, choose Edit and make the needed changes. After you finish reviewing the configuration details, choose Create.

After a few moments, the Stacks list reappears. Your stack is listed with a status of Active.

**Create a streaming URL**

To quickly test application streaming without setting up users, create a temporary URL that can be pasted into a new browser window.

1. In the navigation pane, choose Stacks.

2. For Stacks, select the stack that you just created.

3. Choose Actions, Create streaming URL.
4. In the **Create streaming URL** dialog box, type the following information and choose **Get URL**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
</table>
| **User id**      | An ID for the user of the streaming URL. For this exercise, type *DemoCoTestUser1*.  
|                  | Note: This entry is not tied to Active Directory or an LDAP type of directory service. It is simply an identifier for creating a unique URL. |
| **Session Expiration** | The length of time that this URL is available to use. For this exercise, choose **1 hour**. |

5. The **Create streaming URL** dialog box refreshes, displaying the user ID that you entered and the URL that AppStream 2.0 generated for the user.

6. Choose **Copy Link** to copy the full URL to the clipboard.

7. The **Create streaming URL** dialog box refreshes again, confirming that the link was successfully copied to the clipboard. Close the **Create Streaming URL** dialog box.

**Notes:**

- Providing access to an AppStream 2.0 streaming session through a console-generated link as described in this procedure is for testing only.
- In a production environment, several authentication and authorization options are available to provide your users with access to AppStream 2.0.
These options include federation through SAML 2.0, the AppStream 2.0 user pool (a built-in identity management feature), and custom identity solutions. For more information, see Setting up SAML and Manage Access with the AppStream 2.0 User Pool.

8. In a browser, open a new tab, paste the streaming URL into the address bar, and press **Enter**. AppStream 2.0 displays an application catalog page that lists the applications that you have configured for streaming.

![AppStream 2.0](image)

*Figure 28: The AppStream 2.0 application catalog page for your streaming environment.*

9. Choose the Chrome icon to stream the Chrome application, and confirm that it functions as expected.

10. To confirm that Notepad++ functions as expected when streaming, choose the application catalog icon on the AppStream 2.0 web toolbar and choose **Notepad++**.
11. After you confirm that both applications function as expected when streaming, close the browser tab that you opened to test the AppStream 2.0 environment.

**Step 8: Manage user access with an AppStream 2.0 user pool**

An AppStream 2.0 user pool is a built-in identity management feature that you can use to enable users to access their streamed applications. Alternatively, you can use SAML 2.0 to federate through Microsoft Active Directory or any other custom identity solution provider that supports SAML 2.0.

**Note:** This guide describes how to manage user access to AppStream 2.0 with the user pool. For information about configuring third-party SAML 2.0 identity provider solutions to work with AppStream 2.0, see [AppStream 2.0 Integration with SAML 2.0](#).

To enable users in the user pool to open applications after they sign in to the AppStream 2.0 user portal, you must assign each user to at least one stack that contains applications. After you assign the user to a stack, AppStream 2.0 sends an optional notification email to the user with instructions about how to access the stack.
and a URL. The user can access the stack by using the URL until you delete the stack or unassign the user from the stack.

In this section, you’ll configure an AppStream 2.0 user pool and grant a user access to AppStream 2.0 by doing the following:

- Create a user in the user pool. AppStream 2.0 then sends a welcome email with instructions and a temporary password.
- Assign the stack that you created to the user.

Create a user


2. In the navigation pane, choose User Pool, Create User.

3. In the Create User dialog box, type the following information and choose Create User.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td>An active email address that you can access.</td>
</tr>
<tr>
<td>First Name</td>
<td>The first name of the user.</td>
</tr>
<tr>
<td>Last Name</td>
<td>The last name of the user.</td>
</tr>
</tbody>
</table>
4. After a few moments, the **User Pool** list refreshes, and the user is listed and enabled.

![User Pool dashboard](image)

*Figure 30: The User Pool dashboard showing the newly created user.*

**Assign a stack to the user**

1. In the navigation pane, choose **User Pool**, and select the user that you created.

2. Choose **Actions**, **Assign Stack**.

3. In the **Assign Stack** dialog box, for **Stack**, select the `DemoCo_Stack_mmddyyyy` stack that you created earlier.

4. Leave the **Send email notification to user** option selected.

5. Choose **Assign Stack**.

6. After a few moments, the **User Pool** list refreshes. The user that you created appears under **User Details** with `DemoCo_Stack_mmddyyyy` as an assigned stack.
Step 9: Test the end user authentication and application streaming experience

In the previous section, you added a user to the user pool by providing a name and an email address and then assigned a stack to the user. AppStream 2.0 sent an email to the email address after each action. To test the end user experience, sign in to AppStream 2.0 as the user that you created and start a streaming session.

1. Open the first notification email that you received, and open the **Login page** link. The AppStream 2.0 portal sign-in page opens in your browser.
2. Type the email address used for the user that you created and the temporary password that was provided in the email, and then choose **Log in**.

3. When prompted, type a new password, confirm it, and then choose **Set Password**. The AppStream 2.0 application catalog page opens, displaying the applications that are available for streaming.

4. Choose an application to begin streaming.

**Step 10: Take the next step with AppStream 2.0**

Congratulations, you have now successfully created an AppStream 2.0 environment to stream applications. Below is an architectural diagram illustrating the AppStream 2.0 environment you created:
This guide provided an introduction to AppStream 2.0 by walking you through basic configuration and deployment exercises. To increase your understanding of AppStream 2.0 and take advantage of more features, consider doing the following:

1. Try using different instance types and sizes to match your application’s requirements. For example, use the Graphics Design instance type to run applications that rely on hardware graphics acceleration. For information about the different instance types and sizes available for AppStream 2.0, and their pricing, see Amazon AppStream 2.0 Pricing.

2. Enable single sign-on (SSO) access to your streamed applications through SAML 2.0. When you do this, your users can use their existing credentials to sign into AppStream 2.0 streaming sessions through your own web portal. For more information, see Single Sign-on Access to AppStream 2.0 Using SAML 2.0.

3. Join your AppStream 2.0 fleets and image builders to domains in Microsoft Active Directory. Your users can then benefit from access to Active Directory network resources such as printers and file shares from within their streaming sessions. You can also apply Group Policy settings to your streaming instances and users to
meet the needs of your organization. For more information, see Using Active Directory with AppStream 2.0.

4. Configure your fleet scaling policies to increase or decrease the number of instances available to users in response to changes in user demand or according to time of day. For more information, see Fleet Auto Scaling for Amazon AppStream 2.0.

**Important:** Remember to delete the resources that you created in these exercises to avoid further charges to your account. For information about how to delete AppStream 2.0 resources, see Appendix E. For more information about AppStream 2.0 pricing, see Amazon AppStream 2.0 Pricing.
Appendix A: Create and activate an AWS account

If you do not already have an AWS account, complete the following steps to create and activate one. During this process, you do the following:

- Create your AWS account.
- Add a payment method.
- Verify your phone number.
- Select an AWS Support plan.
- Watch for three account confirmation emails.

Create your AWS account

1. In a browser window, open the Amazon Web Services webpage.

2. Choose Create an AWS Account. If you’ve signed in to AWS recently, you might see Sign In to the Console instead. If Create a new AWS account isn't visible, choose Sign in to a different account, Create a new AWS account.

3. On the Create an AWS Account page, type a valid email address, a password and password confirmation, and an AWS account name.

4. You must note the account name, email address, and password that you choose for your AWS account because you need these credentials to sign in to AWS.

5. Choose Continue.

6. On the Contact Information page, the option to choose a company account or personal account is available. These two account types function identically. For the exercises in this guide, choose Personal Account, and then enter the requested contact information.

7. Review the AWS Customer Agreement, and select the corresponding check box.

8. Choose Create Account and Continue.
Note: After you receive an email to confirm that your account is created, you can sign in to your new account by using the email address and password that you provided. However, you must continue with the activation process before you can use AWS services.

Add a payment method

On the Payment Information page, type the requested information associated with your payment method. If the address for your payment method is the same as the address you provided for your account, choose Secure Submit.

Otherwise, choose Use a new address, type the billing address for your payment method, and then choose Secure Submit.

Verify your phone number

1. On the Phone Verification page, type a phone number that you can use to accept incoming calls.

2. Type the code displayed in the captcha.

3. When you’re ready to receive the call, choose Call me Now. In a few moments, you’ll receive an automated call from AWS that prompts you to enter your PIN to validate the AWS account.

4. When you receive the call, enter the provided PIN on your phone’s keypad.

5. After the process is complete, choose Continue.

Choose an AWS Support plan

On the Select a Support Plan page, choose Basic. For information about AWS Support, see AWS Support Features.

After you choose a Support plan, a confirmation page indicates that your AWS account is being activated. Accounts are usually activated within a few minutes, but the process may take up to 24 hours. If you attempt to sign in to the AWS Management Console before your account is active, the following message appears:
Watch for three AWS account confirmation emails

When you sign up for your account, you receive three account confirmation emails:

- The first email, with a subject line of “Welcome to Amazon Web Services,” confirms the creation of your AWS account and is sent almost immediately after you verify your phone number.

- The second email, with a subject line of “AWS Support (Basic) Sign-Up Confirmation,” confirms the AWS Support option that you selected during the account creation process.

- The third email, with a subject line of “Your AWS Account is Ready - Get Started Now,” is sent after your AWS account ID is ready to use. After you receive this email, you can access AWS services by using the [AWS Management Console](https://aws.amazon.com/console/).
Appendix B. Manually create and configure network resources

Step 2 of this guide described how to use a CloudFormation template to automatically create and configure the necessary network resources for your AppStream 2.0 environment. To manually create and configure network resources, follow the steps in this appendix. At the end of this appendix, the topology of your “DemoCo” VPC should look similar to the following diagram:

![Diagram of DemoCo VPC architecture](image)

*Figure 35: DemoCo VPC architecture.*

**Note:** The CIDR block assignments for the private subnets might be reversed depending on the availability zones used by the VPC wizard.
AppStream VPC requirements

At a minimum, AppStream 2.0 requires a VPC that includes one public subnet and two private subnets. A public subnet has direct access to the internet through an internet gateway. A private subnet requires a Network Address Translation (NAT) gateway or NAT instance to access the internet.

Allocate an Elastic IP address

Before you create your VPC, you must allocate an Elastic IP address in your AppStream 2.0 region. An Elastic IP address enables your streaming instances to be accessible through an internet gateway.

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2.
2. In the navigation pane, under Network & Security, choose Elastic IPs.
3. Choose Allocate New Address and then choose Allocate.
4. Note the Elastic IP address and then choose Close.

![Figure 36: An allocated Elastic IP address.](image)

Create a VPC by using the VPC Wizard

The easiest way to start building your VPC environment is to use the VPC Wizard. The wizard guides you through the process of creating a public subnet, private subnet, NAT gateway, and internet gateway, with the correct route table configurations.

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, choose VPC Dashboard, Start VPC Wizard.
3. In **Step 1: Select a VP Configuration**, choose **VPC with Public and Private Subnets**, Select.

![Figure 37: Creating a VPC with the VPC Wizard.](image)

4. In **Step 2: VPC with Public and Private Subnets**, type the following information and then choose **Create VPC**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPv4 CIDR block</td>
<td>10.0.0.0/20</td>
</tr>
<tr>
<td>IPv6 CIDR block</td>
<td>Accept the default value: <em>No IPv6 CIDR Block</em></td>
</tr>
<tr>
<td>VPC Name</td>
<td>AppStream2 VPC</td>
</tr>
<tr>
<td>Public subnet’s IPv4 CIDR</td>
<td>Accept the default value: 10.0.0.0/24</td>
</tr>
<tr>
<td>Availability Zone</td>
<td>Accept the default value: <em>No Preference</em></td>
</tr>
<tr>
<td>Public subnet name</td>
<td>AppStream2 Public Subnet</td>
</tr>
<tr>
<td>Private subnet’s IPv4 CIDR</td>
<td>Accept the default value: 10.0.1.0/24</td>
</tr>
<tr>
<td>Availability Zone</td>
<td>Accept the default value: <em>No Preference</em></td>
</tr>
<tr>
<td>Private subnet name</td>
<td>AppStream2 Private Subnet1</td>
</tr>
</tbody>
</table>
### Elastic IP Allocation ID
Click in the text box and select the value that corresponds to the Elastic IP address you created. This address is assigned to the NAT gateway.

### Service endpoints
Choose **Add Endpoint**.

- **Service**: Select the entry in the list that ends with "s3" (the `com.amazonaws.xx-rrrr-x.s3` service that corresponds to the region in which the VPC is being created). **Note**: This is not the default value.

### Subnet
Select **Private subnet**.

### Policy
Accept the default value: **Full Access**.

### Enable DNS hostnames
Accept the default value: **Yes**.

### Hardware tenancy
Accept the default value: **Default**.

**Note**: The VPC names and subnet names are for identification purposes only. You can use different names.

5. After a few minutes, when a message in the VPC dashboard notifies you that the VPC is created, choose **OK**.

**Add a second private subnet**

1. In the navigation pane, choose **Subnets**.

2. Select the subnet with the name **AppStream2 Private Subnet1**. On the **Summary** tab, below the list of subnets, make a note of the Availability Zone for this subnet.
3. At the top of the same page, choose **Create Subnet**. Enter the following information in the **Create Subnet** dialog box and then choose **Yes, Create**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name tag</td>
<td>AppStream2 Private Subnet2</td>
</tr>
<tr>
<td>VPC</td>
<td>Select the VPC with the name <em>AppStream2 VPC.</em></td>
</tr>
<tr>
<td>Availability Zone</td>
<td>Select an Availability Zone other than the one you are using for AppStream2 Private Subnet1. Selecting a different Availability Zone increases fault tolerance.</td>
</tr>
<tr>
<td>IPv4 CIDR block</td>
<td>10.0.2.0/24 (This is a subset of the CIDR block for your VPC.)</td>
</tr>
</tbody>
</table>

**Modify the subnet route tables**

1. In the navigation pane, choose **Subnets**, and then select the subnet with the name *AppStream2 Public Subnet*.

2. On the **Route Table** tab, note the ID of the route table (similar to *rtb-XXXXXXXX*).

3. In the navigation pane, choose **Route Tables** and select the route table with the ID that you noted in the previous step.
4. For **Name**, open the empty field, type **AppStream2 Public Route Table**, and then select the check mark to save your changes.

![Route Table Image]

*Figure 39: Opening the name field for the route table that serves the AppStream2 Public Subnet.*

5. Make sure that **AppStream2 Public Route Table** is still selected. On the **Routes** tab, verify that the route table includes the following two routes:

<table>
<thead>
<tr>
<th>Destination</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0.0.0/20</td>
<td>local</td>
</tr>
<tr>
<td>0.0.0.0/0</td>
<td>igw-XXXXXXX</td>
</tr>
</tbody>
</table>

These two routes function as follows for all resources within a subnet that is associated with the route table:

- **Local**: All traffic from the resources destined for IPv4 addresses within the 10.0.0.0/20 CIDR block is routed locally within the VPC.
- **Outbound**: Traffic destined for all other IPv4 addresses is routed to the internet gateway (identified by *igw-XXXXXXX*) that was created by the VPC Wizard.

To modify the route table, choose **Edit** and make the needed changes. For more information, see **Route Tables**.

6. In the navigation pane, choose **Subnets** and select the subnet named **AppStream2 Private Subnet1**.

7. On the **Route Table** tab, note the ID of the route table (similar to *rtb-XXXXXXX*).

8. In the navigation pane, choose **Route Tables** and select the route table with the ID you noted in the previous step.

9. For **Name**, open the empty field, type **AppStream2 Private Route Table**, and then select the check mark to save your changes.
10. Make sure that **AppStream2 Private Route Table** is still selected, and on the **Routes** tab, verify that the route table includes the following routes:

<table>
<thead>
<tr>
<th>Destination</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0.0.0/20</td>
<td>local</td>
</tr>
<tr>
<td>0.0.0.0/0</td>
<td>nat-XXXXXXXXXXXXXXXXXXXXX</td>
</tr>
<tr>
<td>pl-YYYYYYYYY (com.amazonaws.&lt;region&gt;-&lt;#&gt;.s3)</td>
<td>vpce-ZZZZZZ</td>
</tr>
</tbody>
</table>

These three routes function as follows for all resources within a subnet that is associated with the route table:

- **Local**: All traffic from the resources destined for IPv4 addresses within the 10.0.0.0/20 CIDR block is routed locally within the VPC.
- **Storage**: Traffic destined for S3 buckets is routed to the S3 endpoint (identified by *vpce-ZZZZZZZ*).
- **Outbound**: Traffic destined for all other IPv4 addresses is routed to the NAT gateway (identified by *nat-XXXXXXXX*).

To modify the route table, choose **Edit** and make the needed changes. For more information, see [Route Tables](#).

11. In the navigation pane, choose **Subnets** and select the subnet with the name **AppStream2 Private Subnet2**.

12. On the **Routes** tab, verify that the route table is the one named AppStream2 Private Route Table. If the route table is different, choose **Edit** and select this route table.
Appendix C. Configure Chrome

After you install applications on your image builder instance, you might need to configure them before creating your image. Examples of tasks or configurations to consider at this stage include:

- Applying patches or updates
- Managing auto-update functionality
- Creating startup or run/runonce commands
- Performance tuning
- Disabling application startup prompts, such as license prompts or first-run experiences.
- Configuring file associations
- Clearing or resetting log files or event logs

Chrome includes an automated update process that you can disable so that users aren’t exposed to it. Use Windows Task Scheduler to disable it with the following steps.

**Note:** Although these steps are specific to Chrome, you may need to perform similar steps to disable updates for other applications that you configure for streaming through AppStream 2.0.

1. In your image builder instance, choose the Windows Start menu.
3. Open Task Scheduler.
4. When Task Scheduler opens, expand the window to full screen for easier viewing.
5. On the left side, under Task Scheduler (Local), choose Task Scheduler Library. Click the Name column in the center pane to sort the task names alphabetically. If necessary, widen the Name column to display the full names of the listed items.
6. Select the task GoogleUpdateTaskMachineUA. Choose Action, Delete. When prompted, choose Yes.
Figure 41: Windows Task Scheduler with the GoogleUpdateTaskMachineUA task selected.

7. Repeat step 6 to delete the GoogleUpdateTaskMachineCore task.


9. Disable any auto update services. In the Administrative Tools window, which should still be open, open Services.

10. When the Services window opens, expand the window to full screen for easier viewing. In the list, open the first of two Google Update Service entries, Google Update Service (gupdate).

Figure 42: Windows Services, with the two Google Update services listed.

11. For Startup type, choose Manual.
12. Next to the Service status label, verify that the service shows the status Stopped.
   If not, choose Stop.

13. Choose Apply, OK.

14. Repeat steps 10 to 13 for Google Update Service (gupdatem).

15. Close Services and any other open windows.
Appendix D. Install Notepad++

Step 4 in this guide described how to connect to an image builder and download the installer for Notepad++. To complete the Notepad++ installation process, follow these steps.

1. Connect to the _DemoCo_Image1_mmddyyyy_ image builder that you created.

2. In the image builder, in File Explorer, open the Downloads folder and open _npp.x.x.x.Installer.x64.exe_.

3. In Installer Language, choose English if it is not already selected, and then choose OK.

4. In Welcome to Notepad++ Setup, choose Next.

5. In License Agreement, review the agreement and then choose I Agree.

6. In Choose Install Location, choose Next to accept the default destination folder for the installation and proceed.

7. In Choose Components, leave the default components selected, and then choose Next.

8. In the next Choose Components page, leave all three options unselected, and then choose Install.

9. In Completing Notepad++ Setup, clear the Run Notepad++ check box so that it is not selected, and then choose Finish.
Appendix E. Clean up your AppStream 2.0 resources

Although you can continue to use this AppStream 2.0 environment, keep in mind that you pay for your running resources. For more information, see Amazon AppStream 2.0 Pricing.

Cleaning up the resources that you created frees up resources and helps you avoid unintended charges to your account.

Stop and delete your image builder

2. In the navigation pane, choose Images, Image Builder.

3. Confirm whether the image builder that you created in Step 3 in this guide is in a stopped state. If not, select the image builder and choose Actions, Stop. If you created multiple image builders, repeat this step for each image builder that you created.

4. After the image builder has stopped, choose Actions, Delete. Repeat this step for each image builder that you created.

Revoke stack permissions for users in the user pool
1. In the navigation pane, choose User Pool.

2. Select the user you created in Step 9 in this guide and choose Actions, Unassign stack. This action revokes the stack permissions for the user.

Disassociate your fleets from your stack and delete your stack
1. In the navigation pane, choose Stacks.

2. Select the stack you created and choose Actions, Dissociate Fleet. This action dissociates the fleet from the stack.

3. To delete the stack, choose Actions, Delete.

Stop and delete your fleet
1. In the navigation pane, choose Fleets.
2. Confirm whether the fleet that you created in Step 6 in this guide is in a stopped state. If not, select the fleet and choose Actions, Stop.

3. After the fleet has stopped, choose Actions, Delete.
Appendix F. Additional resources

For more information about AppStream 2.0, visit the following resources:

- Amazon AppStream 2.0 Product Details
- Amazon AppStream 2.0 Pricing Details
- Amazon AppStream 2.0 FAQs
- Amazon AppStream 2.0 Developer Guide
- Amazon AppStream 2.0 API Reference
- Amazon AppStream 2.0 CLI Reference
- Amazon AppStream 2.0 Try It Now Demo
- Amazon AppStream 2.0 Resources