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Amazon EBS Volumes

An Amazon EBS volume is a durable, block-level storage device that you can attach to a single EC2 instance. You can use EBS volumes as primary storage for data that requires frequent updates, such as the system drive for an instance or storage for a database application. You can also use them for throughput-intensive applications that perform continuous disk scans. EBS volumes persist independently from the running life of an EC2 instance.

After a volume is attached to an instance, you can use it like any other physical hard drive. EBS volumes are flexible. For current-generation volumes attached to current-generation instance types, you can dynamically increase size, modify the provisioned IOPS capacity, and change volume type on live production volumes.

Amazon EBS provides the following volume types: General Purpose SSD (`gp2`), Provisioned IOPS SSD (`io1`), Throughput Optimized HDD (`st1`), Cold HDD (`sc1`), and Magnetic (`standard`, a previous-generation type). They differ in performance characteristics and price, allowing you to tailor your storage performance and cost to the needs of your applications. For more information, see Amazon EBS Volume Types.

Amazon EBS Volume Types

Amazon EBS provides the following volume types, which differ in performance characteristics and price, so that you can tailor your storage performance and cost to the needs of your applications. The volumes types fall into two categories:

- SSD-backed volumes optimized for transactional workloads involving frequent read/write operations with small I/O size, where the dominant performance attribute is IOPS
- HDD-backed volumes optimized for large streaming workloads where throughput (measured in MiB/s) is a better performance measure than IOPS

The following table describes the use cases and performance characteristics for each volume type.

Note

AWS updates to the performance of EBS volume types may not immediately take effect on your existing volumes. To see full performance on an older volume, you may first need to perform a `ModifyVolume` action on it. For more information, see Modifying the Size, IOPS, or Type of an EBS Volume on Windows.

	Solid-State Drives (SSD)		Hard Disk Drives (HDD)	
Volume Type	General Purpose SSD (`gp2`)*	Provisioned IOPS SSD (`io1`)	Throughput Optimized HDD (`st1`)	Cold HDD (`sc1`)

Description	General purpose SSD volume that balances price and performance for a wide variety of workloads	Highest-performance SSD volume for mission-critical low-latency or high-throughput workloads	Low-cost HDD volume designed for frequently accessed, throughput-intensive workloads	Lowest cost HDD volume designed for less frequently accessed workloads
API Name	`gp2`	`io1`	`st1`	`sc1`
Volume Size	1 GiB - 16 TiB	4 GiB - 16 TiB	500 GiB - 16 TiB	500 GiB - 16 TiB
Max. IOPS/Volume**	16,000***	64,000****	500	250
Max. Throughput/Volume	250 MiB/s***	1,000 MiB/s†	500 MiB/s	250 MiB/s
Max. IOPS/Instance††	80,000	80,000	80,000	80,000
Max. Throughput/Instance††	1,750 MiB/s	1,750 MiB/s	1,750 MiB/s	1,750 MiB/s
Dominant Performance Attribute	IOPS	IOPS	MiB/s	MiB/s

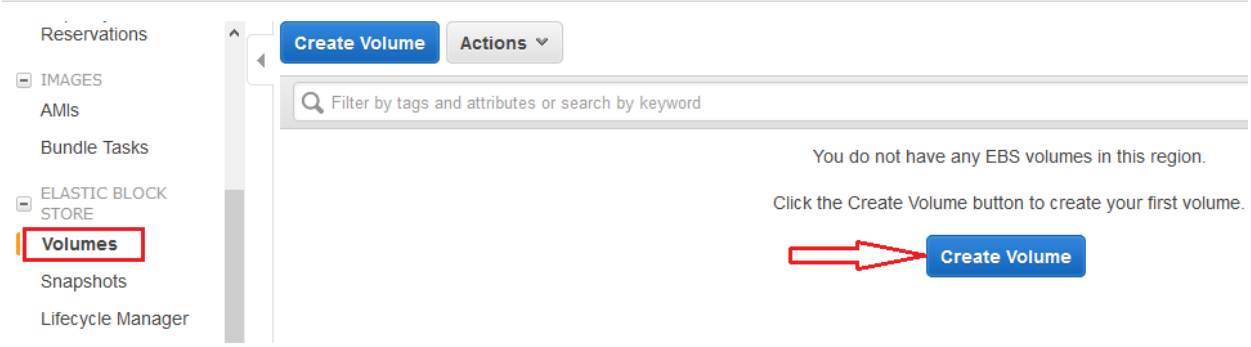
Creating an Amazon EBS Volume

You can create an Amazon EBS volume that you can then attach to any EC2 instance within the same Availability Zone. You can choose to create an encrypted EBS volume, but encrypted volumes can only be attached to selected instance types. For more information, see Supported Instance Types. You can use IAM policies to enforce encryption on new volumes. For more information, see the example IAM policies in Working with Volumes and Launching Instances (RunInstances).

If you are creating a volume for a high-performance storage scenario, you should make sure to use a Provisioned IOPS SSD (`io1`) volume and attach it to an instance with enough bandwidth to support your application, such as an EBS-optimized instance or an instance with 10-Gigabit network connectivity. The same advice holds for Throughput Optimized HDD (`st1`) and Cold HDD (`sc1`) volumes.

To create an EBS volume using the console

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. From the navigation bar, select the region in which you would like to create your volume. This choice is important because some Amazon EC2 resources can be shared between regions, while others can't. For more information, see Resource Locations.
3. In the navigation pane, choose **ELASTIC BLOCK STORE**, **Volumes**.

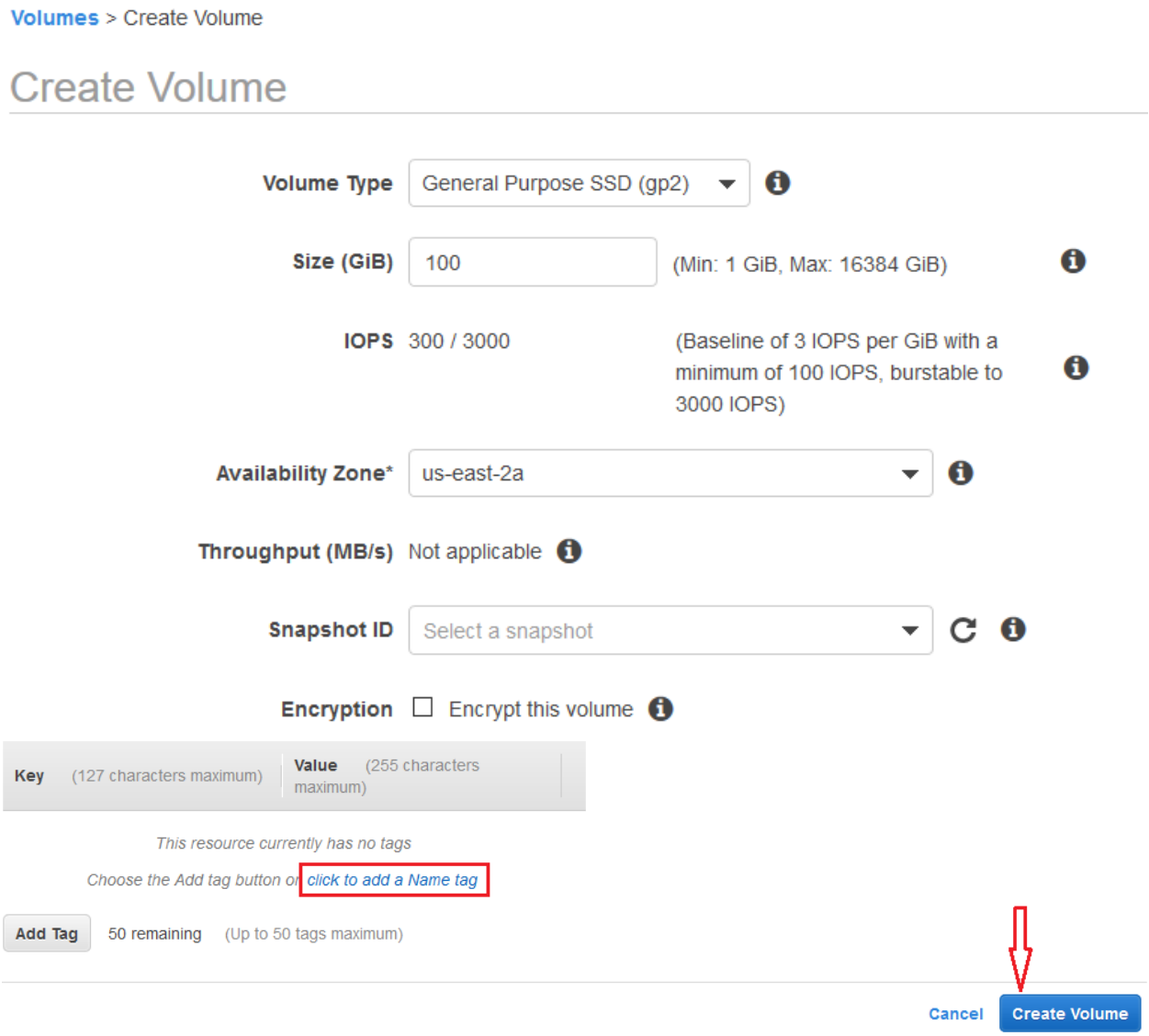


4. Choose **Create Volume**.
5. For **Volume Type**, choose a volume type.
6. For **Size (GiB)**, type the size of the volume.

   Note

   The following Amazon EBS volume considerations apply to Windows boot volumes:

   - Windows boot volumes must use an MBR partition table, which limits the usable space to 2 TiB, regardless of volume size.
   - Windows boot volumes of 2 TiB (2048 GiB) that have been converted to use a dynamic MBR partition table display an error when examined with Disk Manager.
7. With a Provisioned IOPS SSD volume, for **IOPS**, type the maximum number of input/output operations per second (IOPS) that the volume should support.
8. For **Availability Zone**, choose the Availability Zone in which to create the volume. EBS volumes can only be attached to EC2 instances within the same Availability Zone.
9. (Optional) Choose **Create additional tags** to add tags to the volume. For each tag, provide a tag key and a tag value.
10. Choose **Create Volume**.



Attaching an Amazon EBS Volume to an Instance

You can attach an available EBS volume to one of your instances that is in the same Availability Zone as the volume.

Prerequisites

- Determine how many volumes you can attach to your instance. For more information, see Instance Volume Limits.
- If a volume is encrypted, it can only be attached to an instance that supports Amazon EBS encryption. For more information, see Supported Instance Types.
- If a volume has an AWS Marketplace product code:
  - The volume can only be attached to a stopped instance.
  - You must be subscribed to the AWS Marketplace code that is on the volume.

- The configuration (instance type, operating system) of the instance must support that specific AWS Marketplace code. For example, you cannot take a volume from a Windows instance and attach it to a Linux instance.
- AWS Marketplace product codes are copied from the volume to the instance.

To attach an EBS volume to an instance using the console

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, choose **Elastic Block Store**, **Volumes**.
3. Select an available volume and choose **Actions**, **Attach Volume**.
4. For **Instance**, start typing the name or ID of the instance. Select the instance from the list of options (only instances that are in the same Availability Zone as the volume are displayed).
5. For **Device**, you can keep the suggested device name, or type a different supported device name..
6. Choose **Attach**.
7. Connect to your instance and mount the volume. For more information

Making an Amazon EBS Volume Available for Use on Windows

After you attach an Amazon EBS volume to your instance, it is exposed as a block device, and appears as a removable disk in Windows. You can format the volume with any file system and then mount it. After you make the EBS volume available for use, you can access it in the same ways that you access any other volume. Any data written to this file system is written to the EBS volume and is transparent to applications using the device.

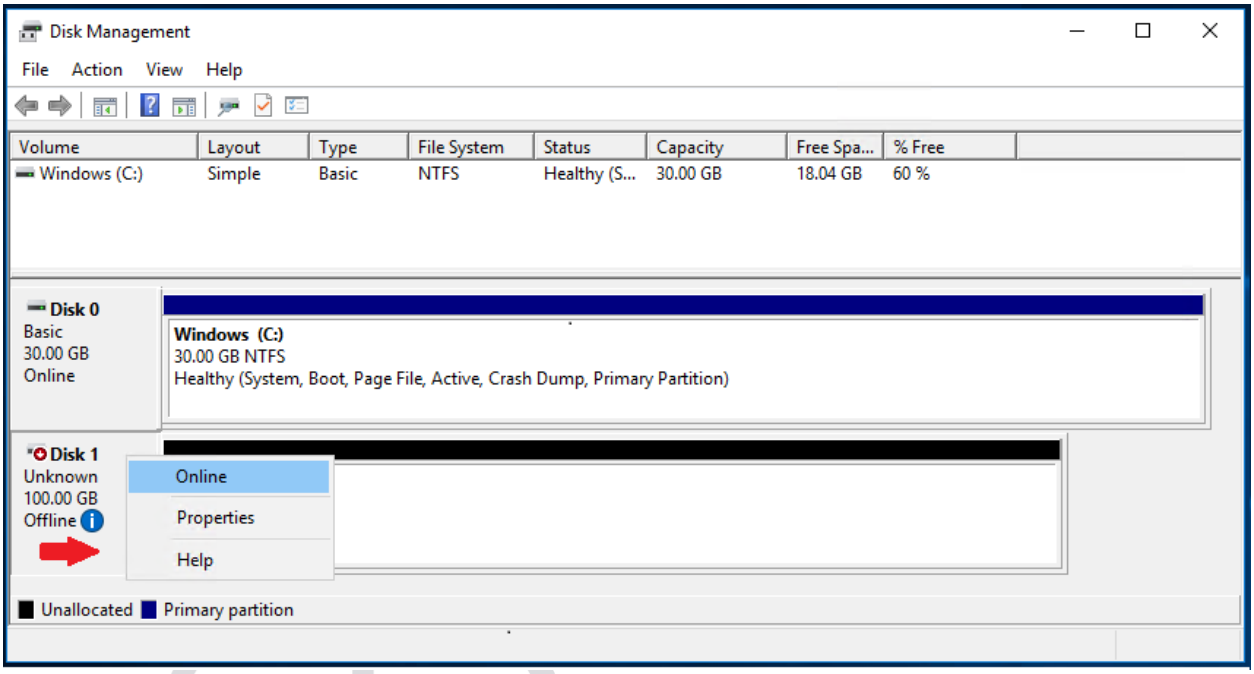
To make an EBS volume available for use using the Disk Management utility

1. Log in to your Windows instance using Remote Desktop.
2. Start the Disk Management utility. On the taskbar, open the context (right-click) menu for the Windows logo and choose **Disk Management**.

   Note

   On Windows Server 2008, choose **Start**, **Administrative Tools**, **Computer Management**, **Disk Management**.

3. Bring the volume online. In the lower pane, open the context (right-click) menu for the left panel for the disk for the EBS volume. Choose **Online**.

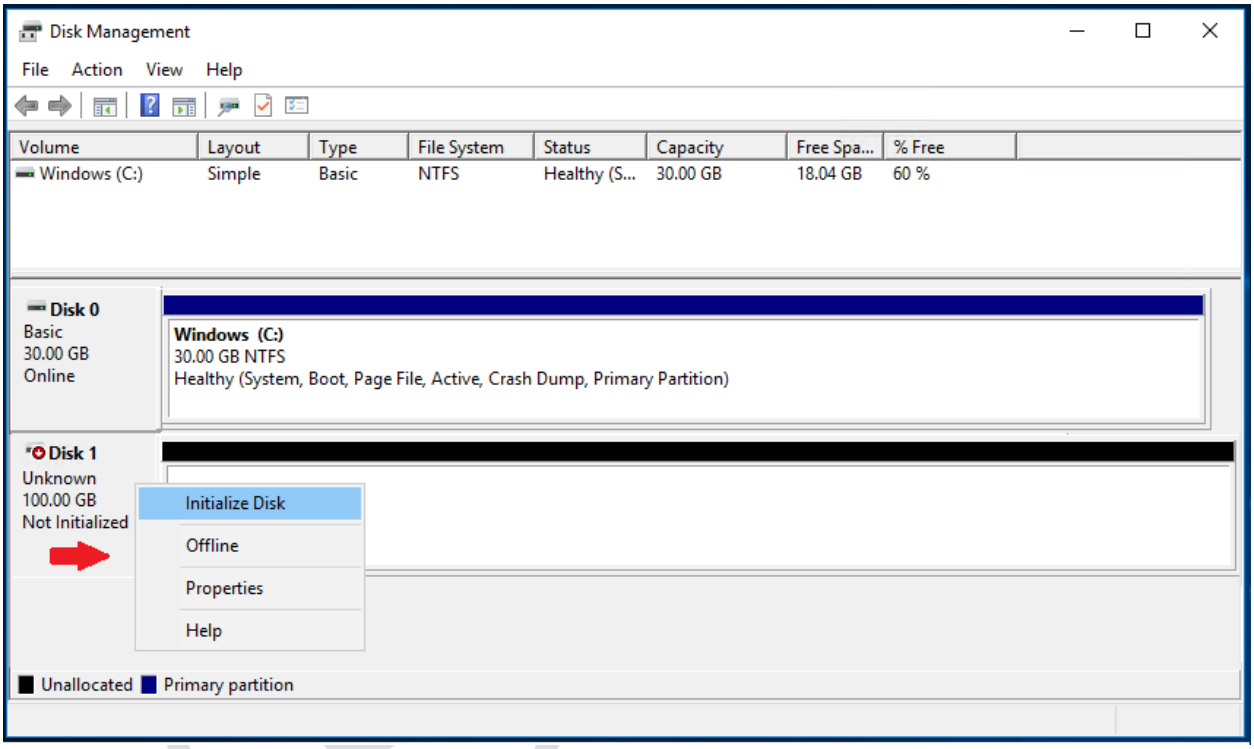


4. (Conditional) You must initialize the disk before you can use it.

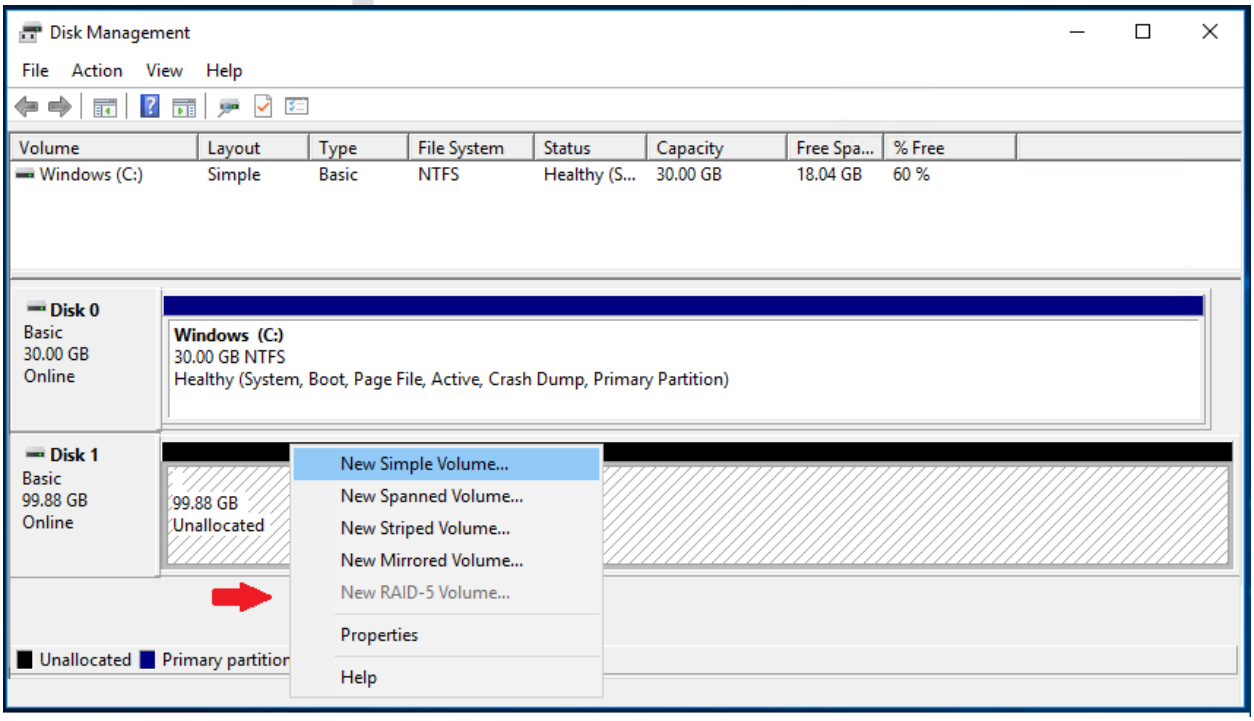
   Warning

   If you're mounting a volume that already has data on it (for example, a public data set, or a volume that you created from a snapshot), do not reformat the volume or you will delete the existing data.

   If the disk is not initialized, initialize it as follows. Open the context (right-click) menu for the left panel for the disk and choose **Initialize Disk**. In the **Initialize Disk** dialog box, select a partition style and choose **OK**.



5. Open the context (right-click) menu for the right panel for the disk and choose **New Simple Volume**. Complete the wizard.



Detaching an Amazon EBS Volume from an Instance

You can detach an Amazon EBS volume from an instance explicitly or by terminating the instance. However, if the instance is running, you must first unmount the volume from the instance.

If an EBS volume is the root device of an instance, you must stop the instance before you can detach the volume.

Important

After you detach a volume, you are still charged for volume storage as long as the storage amount exceeds the limit of the AWS Free Tier. You must delete a volume to avoid incurring further charges.

This example unmounts the volume and then explicitly detaches it from the instance. This is useful when you want to terminate an instance or attach a volume to a different instance.

You can reattach a volume that you detached (without unmounting it), but it might not get the same mount point. If there were writes to the volume in progress when it was detached, the data on the volume might be out of sync.

To detach an EBS volume using the console

1. Unmount the volume. Choose **Disk Management**, right-click the volume, and then choose **Change Drive Letter and Path**. Select the mount point and choose **Remove**.
2. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
3. In the navigation pane, choose **Volumes**.
4. Select a volume and choose **Actions**, **Detach Volume**.
5. In the confirmation dialog box, choose **Yes, Detach**.

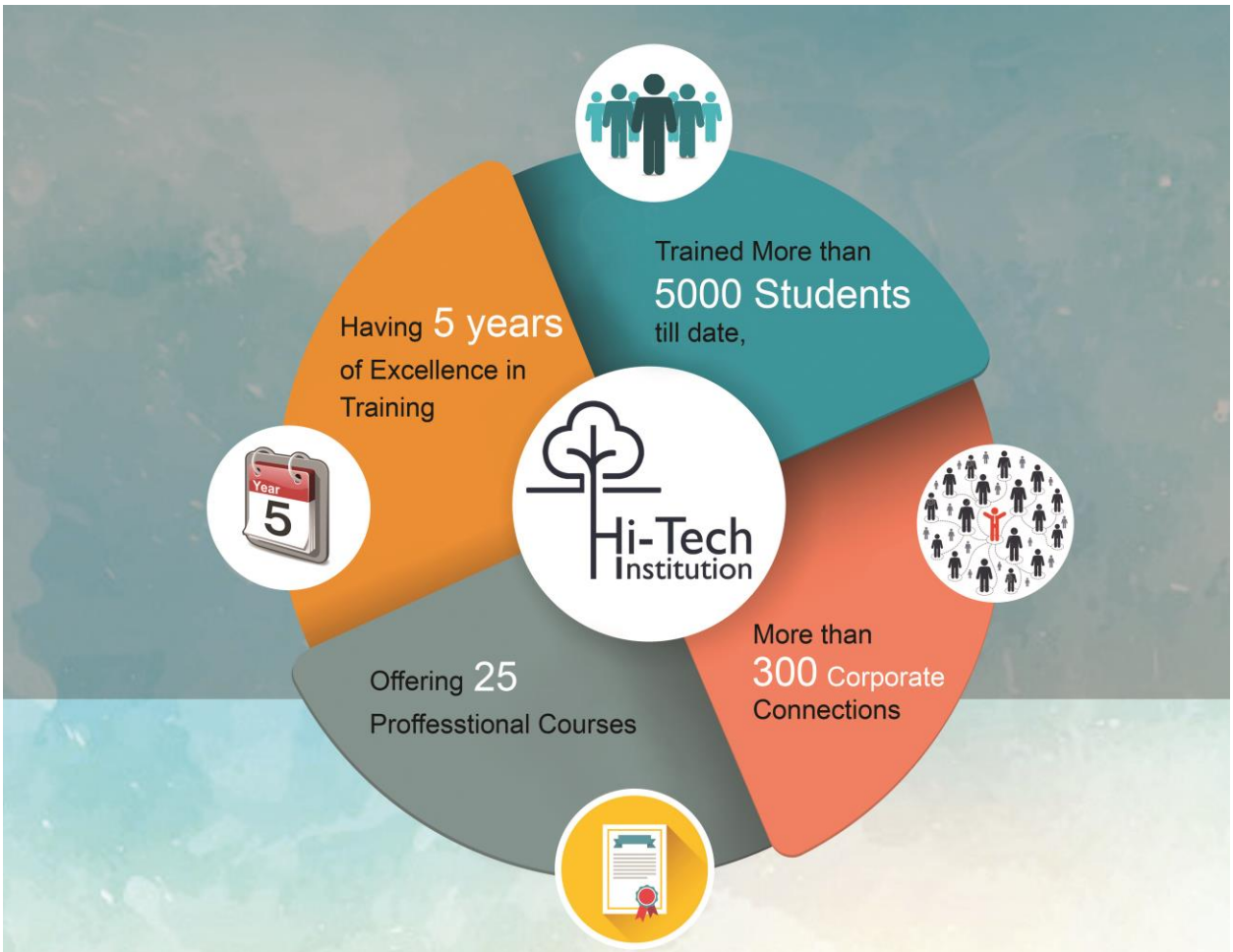
Deleting an Amazon EBS Volume

After you no longer need an Amazon EBS volume, you can delete it. After deletion, its data is gone and the volume can't be attached to any instance. However, before deletion, you can store a snapshot of the volume, which you can use to re-create the volume later.

To delete a volume, it must be in the `available` state (not attached to an instance).

To delete an EBS volume using the console

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, choose **Volumes**.
3. Select a volume and choose **Actions**, **Delete Volume**.
4. In the confirmation dialog box, choose **Yes, Delete**.



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