EBS vs EFS vs FSx vs S3: How These Storage Options Differ

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What are the different types of Amazon Web Services storage options, and which is best to host your data on the cloud?

Business adoption of cloud storage continues to rise, with [30% of companies](https://www.spiceworks.com/marketing/reports/storage-trends-in-2020-and-beyond/) now storing information online. AWS dominates the data storage market. Amazon S3 Standard holds a commanding 27% share of frequently accessed simple storage service.

However, AWS offers multiple ways to save and store data, not just via S3.

EBS vs EFS vs FSx vs S3 often confuses new customers. What does each service offer? And which one is right for your business needs?

This article helps explain the different AWS storage options.

Learn the differences between Elastic Block Store and Standard Storage Service. See how FSx compares to Elastic File System.

Read on to choose the correct storage option to future-proof your company. And how hiring the [right AWS partner](https://pilotcoresystems.com/aws-cloud-partner) is critical to that success.

Amazon Web Services Storage Options

AWS offers a range of data storage services, including block storage, file storage, and object storage. Each employs a unique way to store information on the cloud.

For example, simple storage service or S3 tends to be a catch-all system for companies to store data in 'buckets.' Objects include metadata for easy reference and retrieval as needed.

On the other hand, block storage holds no metadata, which often gives the advantage of speed and stability for larger data sets. In comparison, file storage works with hierarchal information.

We'll discuss these three types throughout the article, but what does AWS offer in terms of storage services?

AWS Storage Services

Amazon Web Services has eleven ways its [data storage and transfer solutions](https://aws.amazon.com/products/storage/) can be used. They include backup and data migration to transfer your information to the cloud.

The four primary services that deal specifically with storing data are:

* [Amazon Elastic Block Store](https://pilotcoresystems.com/insights/ebs-efs-fsx-s3-how-these-storage-options-differ#elastic-block-store)
* [Amazon Elastic File System](https://pilotcoresystems.com/insights/ebs-efs-fsx-s3-how-these-storage-options-differ#elastic-file-system)
* [Amazon FSx](https://pilotcoresystems.com/insights/ebs-efs-fsx-s3-how-these-storage-options-differ#amazon-fsx)
* [Amazon Simple Storage Service](https://pilotcoresystems.com/insights/ebs-efs-fsx-s3-how-these-storage-options-differ#amazon-s3)

This guide breaks each of these down by explaining what they do and how they work. We also summarize the main pros and cons when matching the services together, then provide a summary at the end.

**Elastic Block Store**

[Amazon Elastic Block Store](https://aws.amazon.com/ebs/) or EBS is a high-performance, block-storage service to store data on the cloud.

EBS volumes attach to Amazon Elastic Compute Cloud (EC2) instances for transaction-heavy workloads that scale. Large enterprise apps may use EBS to store self-managed relational and NoSQL databases. They may then run big data analytics engines against this information that work at lightning speed.

Amazon offers six types of volume to suit any budget and performance specification. They come in either SSD or HDD flavours. Each can be fine-tuned, and the volume size increased without disrupting the overall service.

But what exactly is block storage, and what are the benefits it brings?

What Is Block Storage?

Block-level storage saves data as 'blocks' or segments on cloud-based environments. Every block has its unique identifier but contains no related information like metadata.

Developers choose this option when they need ultra-quick, reliable, and efficient data access.

The reason is that blocks get stored wherever they're most efficient. They don't need to reside on one server or one specific operating system. Because they're decoupled, the underlying storage system gathers blocks together as required. And that makes the service run fast.

Pros and Cons of Elastic Block Store

EBS's biggest strengths are its reliable performance and flexibility.

It's ideal for apps that need low latency with many IO operations like database servers. It's scalable, so you can add extra block storage volumes without dropping performance.

Unlike object storage, block stores only overwrite individual data blocks, not the entire object. That alone speeds the update process significantly.

While most EBS volumes can only bind to one server at a time, the launch of [Amazon EBS Multi-Attach](https://aws.amazon.com/about-aws/whats-new/2020/02/ebs-multi-attach-available-provisioned-iops-ssd-volumes/) for provisioned IOPS volumes offers greater flexibility in some scenarios.

Searching blocks also takes time as they contain no corresponding metadata. And EBS often needs maintenance personnel to run, which adds additional expense.

**Elastic File System**

[Amazon Elastic File System](https://aws.amazon.com/efs/) (EFS) is a fully managed and scalable **NFS file system** that can be mounted to EC2 instances and on-premises compute resources.

EFS offers elastic/scalable storage, reaching petabytes of data without disrupting apps. The service works with thousands of Amazon EC2 instances with consistent low-latencies. That's why many enterprises use it to transfer their apps directly onto the cloud.

Amazon offers two types of file system storage in EFS: Standard and Infrequent Access storage class (EFS IA).

The latter option reduces the cost to as low as $0.025/GB-month. And as 80% of typical workloads are infrequently accessed, this results in huge savings.

What Is File System Storage?

File storage, or file-level/file-based storage, has been a staple of traditional computing for decades.

Data gets saved in directory trees, folders, and traditional files. It's similar to a local hard drive running Microsoft Windows or Linux. There's one way to access data, unlike block storage's method of distribution.

A user-level interface works with file storage data to retrieve, save, and delete files and hierarchies.

This layer of abstraction is great when working with cloud data. And AWS overcomes the problems of limited storage with NAS technology by providing a scalable way to save information.

Pros and Cons of Elastic File System

Does your business need a centralized way to store files within a hierarchical folder system? Do you need that data to be easily accessible, scalable, and affordable? If so, the AWS EFS is a perfect choice.

EFS makes shared file systems cloud-compatible and is simple to integrate without significant code changes.

EFS filesystems have UNIX-style user/group permissions and enforces the POSIX chown\_restricted attribute.

On the downside, file-based storage doesn't offer the same performance level as block storage on an IOPS basis. It also only operates with standard protocols like NTFS and NFS. That restricts usage across different platforms.

**Amazon FSx**

AWS EFS has you covered for all file-system storage requirements. Or does it?

EFS works with EC2 instances as a managed NAS filer. FSx, on the other hand, offers a managed Windows Server environment that runs Windows Server Message Block services.

As FSx uses Windows, it's compatible with all Window Server platforms. You get to choose from two services:

* Amazon FSx for Windows File Server - file storage for business apps
* Amazon FSx for Lustre - shared storage for computing workloads

FSx integrates with Microsoft Active Directory for user group management. Fully managed backups are included, along with encrypting data at both ends.

You can access the Windows File Server service from Windows, macOS, or even Linux. These can remain in-house or via virtualization on AWS.

Like ECS, the system is fully scalable, allowing you to attach multiple storage devices as required.

Pros and Cons of Amazon FSx

FSx offers an excellent Windows-based service with its built-in SMB and Active Directory support.

It includes all the security and redundancy benefits that Windows Server brings, like DFS namespaces. Amazon adds Amazon Virtual Private Cloud security to manage network traffic. It also logs system events for auditing purposes.

General Purpose SSD volumes provide a balance between performance and price and are appropriate for most workloads. Provisioned IOPS SSD volumes are designed for high performance and low latency. You can select the capacity you need with sizes reaching 64TB.

However, Amazon FSx can suffer from lower transfer rates compared to native Windows Server platforms. And of course, if you don't use Windows as your OS, then FSx is a non-starter.

**Amazon S3**

Amazon Simple Storage Service (Amazon S3) offers scalable and secure storage for any data type.

Businesses of all sizes use AWS S3 to host their website files, mobile apps, archives, and [data lakes](https://pilotcoresystems.com/insights/what-is-a-data-lake). The 'simple' part refers to how easy the service is to integrate with your use-cases. And millions of companies worldwide take advantage of S3 to save and share their data on the cloud.

Pros and Cons of Amazon Simple Storage

Amazon S3 requires no up-front investment, so you can use the service as needed. Data durability comes as standard because it creates and shares objects across multiple systems.

The service is affordable and can scale as required. Objects can include any data, so S3 lets you serve videos to spreadsheets and everything in between.

Even though the system's designed to be easy to use, monthly support plan costs can get expensive.

The web interface takes a little getting used to. Buckets need configuring, too, and the pricing scheme takes some research to understand.

**EBS vs EFS vs FSx vs S3**

Choosing the right storage option for your [cloud architecture design](https://pilotcoresystems.com/services/cloud-architecture-design) depends on what you need it to do.

For Windows Server requirements, choose the new FSx storage. It's designed to work with that platform and optimized with SMB in mind.

If you need high-speed, low-latency data access for individual EC2 instances, choose EBS.

Elastic File System is perfect if you use a folder/file system, and it can be attached to multiple EC2 instances. Like FSx, you can migrate your apps easily, but it also works with non-Microsoft platforms.

Finally, for everything else, use S3.

AWS Simple Storage Service holds any type of data object you throw at it. So if you're not sure of all the kinds of data you'll need to store or how you will process it, choose S3.

Your AWS Consulting Partner in North America

EBS vs EFS vs FSx vs S3 opens up Pandora's box when choosing the right data storage option.

Careful consideration must be given to select a file system or block storage approach. Your choice depends on IO requirements and scalability, both in the short and long-term. And the ramifications can have far-reaching effects.

That's why many companies hire Pilotcore to provide them with [expert consultancy on AWS storage](https://pilotcoresystems.com/aws-cloud-consulting).

As certified Amazon Web Services partners, we will share our knowledge and expertise with you. That includes AWS cloud architecture design from the ground up.

We can also reduce your monthly AWS bills through our cost optimization service.

[Learn more about our services](https://pilotcoresystems.com/services) and reach out to discuss your cloud architecture. You'll soon discover why 20+ years of our IT consulting experience and AWS certified engineering will benefit your business.