Service Name

Amazon Elastic Block Store (EBS)

Service Overview

Amazon Elastic Block Store (EBS) provides scalable, high-performance block storage resources designed for use with Amazon Elastic Compute Cloud (EC2) instances. EBS volumes function as raw, unformatted block devices that can be attached to EC2 instances and used like traditional hard drives for storing files, installing applications, or hosting databases. EBS offers multiple volume types optimized for different workloads, ranging from cost-effective general-purpose storage to high-performance provisioned IOPS volumes. The service includes point-in-time snapshots for backup and recovery, encryption capabilities, and features like elastic volumes that allow dynamic scaling of capacity and performance without downtime.

Key Use Cases

- Database storage: Primary storage for relational and NoSQL databases like MySQL, PostgreSQL, MongoDB, and enterprise databases such as SAP HANA, Microsoft SQL Server, and Oracle
- File systems and application storage: Boot volumes for EC2 instances, application data storage, and shared storage for distributed applications
- Big data and analytics: Storage for data warehouses, Hadoop analytics clusters, log processing, and MapReduce workloads
- Virtual desktops and development environments: Persistent storage for VDI deployments, development and testing environments
- Backup and disaster recovery: Snapshot-based backup solutions and cross-region data replication for business continuity

Features

- **Multiple Volume Types**: Six volume types including General Purpose SSD (gp3, gp2), Provisioned IOPS SSD (io2 Block Express, io1), and HDD (st1, sc1) optimized for different performance and cost requirements
- **EBS Snapshots**: Point-in-time incremental backups stored in Amazon S3 that can be used to create new volumes, migrate data across regions, or restore data
- **Elastic Volumes**: Ability to dynamically modify volume size, performance, and type in production without service interruption
- **Encryption**: Data-at-rest and data-in-transit encryption using AWS KMS with AES-256 encryption, supporting both AWS managed and customer managed keys
- **Multi-Attach**: Attach a single EBS volume to multiple EC2 instances simultaneously within the same Availability Zone for shared storage scenarios

- **Fast Snapshot Restore**: Enables instant restoration of data from snapshots without initialization latency penalty

Value Proposition

Amazon EBS delivers superior block storage capabilities with 99.8% to 99.999% durability and the flexibility to scale performance independently from storage capacity. Unlike instance store volumes that are ephemeral, EBS provides persistent storage that survives instance failures and can be detached and reattached as needed:

- The service offers predictable performance with options to provision specific IOPS and throughput levels, comprehensive encryption capabilities, and automated backup solutions
- EBS integrates seamlessly with other AWS services and provides cost optimization through multiple volume types, allowing customers to match storage characteristics to workload requirements while maintaining high availability and data protection

Service Integration

Amazon EBS integrates deeply with Amazon EC2 as its primary compute platform, serving as persistent block storage for instances. The service leverages AWS Key Management Service (KMS) for encryption key management and integrates with Amazon Data Lifecycle Manager for automated snapshot scheduling and retention policies:

- AWS Backup provides centralized backup management across EBS volumes, while Amazon CloudWatch delivers monitoring and metrics
- EBS works with AWS CloudFormation for infrastructure as code deployments and integrates with AWS Identity and Access Management (IAM) for access control
- The service also connects with AWS Storage Gateway for hybrid deployments and AWS Elastic Disaster Recovery for comprehensive disaster recovery solutions

Onboarding and Offboarding

Getting started with Amazon EBS involves creating volumes through the EC2 console, AWS CLI, or APIs, then attaching them to EC2 instances within the same Availability Zone. Customers can create volumes from scratch or from existing snapshots, choosing the appropriate volume type based on performance requirements:

- The service supports multiple management interfaces including the AWS Management Console, AWS CLI, AWS Tools for PowerShell, and CloudFormation templates
- Initial setup includes configuring encryption settings, establishing backup policies through snapshots or AWS Backup, and implementing appropriate IAM permissions

- Best practices include right-sizing volumes for workloads, implementing regular snapshot schedules, and monitoring performance metrics through CloudWatch

Getting Started Guide: https://docs.aws.amazon.com/ebs/latest/userguide/ebs-getting-started.html

Data Removal

Data removal from EBS involves detaching volumes from EC2 instances and permanently deleting them, which cannot be undone. Before deletion, customers should create final snapshots for data retention if needed. For encrypted volumes, AWS automatically handles encryption key cleanup. Snapshots can be deleted independently, with charges stopping immediately upon deletion. The service supports secure data sanitization procedures as volumes are presented as raw block devices, allowing customers to perform data wiping operations before deletion if required for compliance purposes.

Backup/Restore and Disaster Recovery

EBS provides comprehensive backup capabilities through snapshots, which are incremental, point-in-time copies stored in Amazon S3 with cross-AZ replication. Amazon Data Lifecycle Manager automates snapshot creation, retention, and deletion policies. AWS Backup offers centralized backup management with cross-region copy capabilities. For disaster recovery, snapshots can be copied across regions, and Fast Snapshot Restore eliminates initialization latency. The service integrates with AWS Elastic Disaster Recovery for complete application-level disaster recovery solutions.

Backup Capabilities

Amazon EBS includes native snapshot functionality for point-in-time backups stored in Amazon S3. The service fully integrates with AWS Backup, providing centralized backup management, automated scheduling, retention policies, and compliance reporting:

- Snapshots are incremental, storing only changed blocks since the last snapshot, and can be automated using Amazon Data Lifecycle Manager
- Cross-region snapshot copying enables geographic backup distribution for enhanced data protection and disaster recovery scenarios

Disaster Recovery

EBS supports disaster recovery through cross-region snapshot replication and integration with AWS Elastic Disaster Recovery (DRS). Snapshots can be copied to multiple regions for geographic redundancy, and Fast Snapshot Restore enables rapid volume recreation without performance penalties:

- The service works with AWS DRS for continuous block-level replication of entire instances including EBS volumes

- Multi-Attach capability supports shared storage scenarios for high-availability architectures within the same Availability Zone

Recovery Objectives

EBS helps achieve aggressive RPO and RTO objectives through frequent automated snapshots (potentially every 15 minutes via Data Lifecycle Manager), Fast Snapshot Restore for instant volume initialization, and cross-region replication capabilities. For RPO, continuous snapshots can minimize data loss to minutes, while Fast Snapshot Restore and pre-warmed volumes can reduce RTO to minutes for volume restoration. Integration with AWS Elastic Disaster Recovery enables RPO of seconds and RTO of minutes for complete application recovery scenarios.

Service Constraints

Service Quotas: https://docs.aws.amazon.com/ebs/latest/userguide/ebs-resource-quotas.html

FAQ: https://aws.amazon.com/ebs/faqs/

Technical Requirements

Service Documentation: https://docs.aws.amazon.com/ebs/latest/userguide/index.html

User Guide: https://docs.aws.amazon.com/ebs/latest/userguide/what-is-ebs.html

API Reference: https://docs.aws.amazon.com/AWSEC2/latest/APIReference/API_Operations_Amazon_Elastic_Block_Store.html

Pricing Overview

Please see the AWS UK G Cloud 15 Pricing Document accompanying this service in the Digital Marketplace.

Public Pricing: https://aws.amazon.com/ebs/pricing/

Cost Optimization

EBS offers several unique cost optimization strategies including migration from gp2 to gp3 volumes for up to 20% cost savings while improving performance, right-sizing volumes to match actual usage patterns, and implementing lifecycle policies for snapshot management to reduce long-term storage costs. The service provides EBS Snapshot Archive for 75% cost reduction on long-term snapshot storage, volume cloning for efficient testing environments, and the ability to independently scale IOPS and throughput on gp3 and io2 volumes to avoid over-provisioning. Customers can optimize costs by deleting unattached volumes, using appropriate volume types for workload characteristics, and leveraging Reserved Instances for predictable workloads.

Savings Considerations

Primary cost savings opportunities include migrating legacy gp2 volumes to gp3 for immediate cost reductions and performance improvements, implementing automated snapshot lifecycle management to prevent indefinite snapshot accumulation, and regularly auditing for unattached or unused volumes. Right-sizing volumes based on actual utilization patterns rather than peak estimates, using HDD volumes (st1, sc1) for throughput-intensive workloads where IOPS are less critical, and implementing EBS Snapshot Archive for long-term retention requirements can significantly reduce costs. Monitoring CloudWatch metrics helps identify over-provisioned volumes, while using volume clones instead of full snapshots for development and testing environments provides additional savings opportunities.