







Selecting the Storage Service

- Simple Storage Service (S3)
- Glacier
- CloudFront
- Elastic Block Store (EBS)
- Storage Gateway
- Snow family
- Databases



Block Storage

- Used on local networks
 - iSCSI
 - Fibre Channel
- AWS can use block storage with virtual machines within the AWS cloud using EBS



File Storage

- AWS uses similar, called object storage in S3
- Used with NAS devices locally



Selecting Storage

- Size
- Performance
- Cost







S3 Storage Overview

- Object storage
- Distributes across at least three Availability Zones
 - Except: 1A (1 zone, least expensive)



S3 Storage Overview

- Supports encryption and automatic data classification
- Big data analytics can run directly against stored data



Getting Data into S3

- API (Application Programming Interface)
- Amazon Direct Connect
- Storage Gateway
- Kinesis Firehose
- Transfer Acceleration



Getting Data into S3

- Snow family
 - Snowball
 - Snowball Edge
 - Snowmobile



Episode 2.03 S3 Terminology



S3 Concepts

- Buckets
- Regions
- Objects
- Keys
- Object URLs
- Eventual consistency
- Works great for static website hosting



S3 Concepts

Works great for static website hosting



Common S3 Operations

- Creating and deleting buckets
- Writing objects
- Reading objects
- Deleting objects
- Managing object properties
- Listing keys in buckets



REST Interface

- Representational State Transfer (REST)
 - S3 API
 - Maps HTTP methods to CRUD operations
 - Create uses PUT or POST
 - Read uses GET
 - Update uses POST or PUT
 - Delete uses DELETE



Episode 2.04 S3 Advanced Features



S3 Features

- Prefixes and delimiters
- Storage classes
- Object lifecycle management
- Encryption
- Versioning



S3 Features

- Multi-Factor Authentication (MFA) Delete
- Multi-part upload
- Range GETs
- Cross-Region replication
- Logging
- Event notifications



Episode 2.05 Creating S3 Buckets Lab



- Creating buckets
- Placing objects
- Managing objects
- Deleting objects







Didn't have any slides for this one







Didn't have any slides for this one







Glacier Overview

- Archival data storage
- Fractions of a penny per GB/month
- Three access methods
 - Expedited (3-5 minutes)
 - Standard (3-5 hours)
 - Bulk (5-12 hours)



Glacier Overview

- You define the Region for data storage
- Data stored with AES 256-bit encryption



Glacier Integration

- •S3 cold data can be automatically moved into Glacier
- •Snow devices can be used to import data
- Storage Gateway can connect to Glacier



Glacier Concepts

- Archives
- Vaults
- Vault locks
- Data retrieval
 - Up to 5% retrieved at no charge, no rollover
 - Vault can be configured to limit costs



Episode 2.09 Setting up a Glacier Vault Lab



Creating vaults and archives



Episode 2.10 Elastic Block Store (EBS)



EBS Overview

- Used for durable storage in EC2 instances
- Block-level storage from one AWS service to another



EBS Volume Types

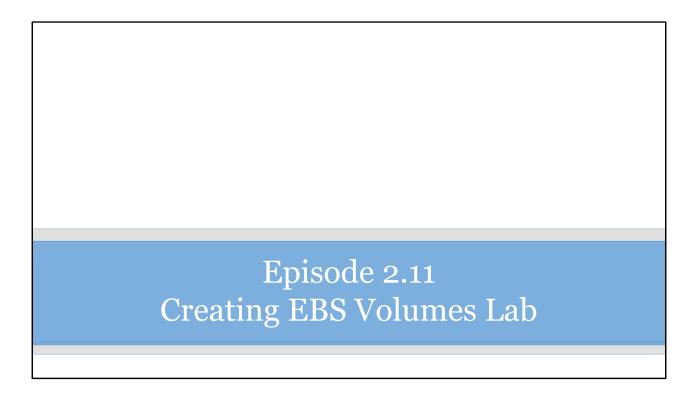
- Magnetic
- SSD (solid-state drive)
 - General purpose
 - Provisioned IOPS
 - PIOPS (provisioned input/output operations per second)
 - EBS-optimized instance should be used



Protecting EBS Data

- Snapshots
- Volume recovery
 - Attaching volumes from one instance to another
- Encryption methods







DEMO

- Creating EBS Volumes
- Managing EBS Volumes



Episode 2.12 Elastic File System (EFS)



EFS Overview

- Shareable
- Hierarchical
- Can be accessed through NFSv4
 - EBS volumes are dedicated to an instance



EFS Overview

- EC2 instances can use EFS shares
- EFS is not supported on Windows instances



Storage Comparison

		File Amazon EFS	Object Amazon S3	Block Amazon EBS
Performance	Per-operation latency	Low, consistent	Low, for mixed request types, and integration with CloudFront	Lowest, consistent
	Throughput scale	Multiple GBs per second	Multiple GBs per second	Single GB per second
Characteristics	Data Availability/Durability	Stored redundantly across multiple AZs	Stored redundantly across multiple AZs	Stored redundantly in a single AZ
	Access	One to thousands of EC2 instances or on-premises servers, from multiple AZs, concurrently	One to millions of connections over the web	Single EC2 instance in a single AZ
	Use Cases	Web serving and content management, enterprise applications, media and entertainment, home directories, database backups, developer tools, container storage, big data analytics	Web serving and content management, media and entertainment, backups, big data analytics, data lake	Boot volumes, transactional and NoSQL databases, data warehousing & ETL

https://aws.amazon.com/efs/when-to-choose-efs/



Episode 2.13 Creating an EFS File System Lab



DEMO

Creating an EFS share for an instance



AWS Storage Gateway

- Uses a software appliance to implement the gateway
- Provides three types of storage solutions:
 - File-based
 - Volume-based
 - Tape-based



Episode 2.14
Integrating On-Premises Storage



AWS Storage Gateway

- Software appliance creates the gateway
- Provides three types of storage solutions:
 - File-based
 - Volume-based
 - Tape-based



Utilization Process

• https://docs.aws.amazon.com/storagegateway/latest/userguide/WhatIsStorageGateway.html



Episode 2.15
Storage Access Security Lab



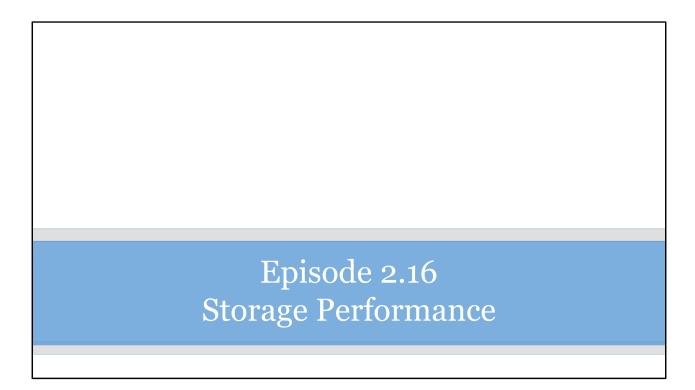
DEMO

- Show storage security management in AWS Management Console
- Review security commands for the AWS CLI
- Contrast with internal security within an instance in an EBS volume



```
{ "Id": "Policy1540923417431", "Version":
  "2012-10-17", "Statement": [ { "Sid":
  "Stmt1540923412641", "Action": "s3:*",
  "Effect": "Allow", "Resource":
  "arn:aws:s3:::marketing-widget-2018",
  "Principal": { "AWS": [
  "arn:aws:iam::989745111221:user/AmyThomas"
  ] } } ] }
```







Storage Performance

- EBS volume types
 - https://docs.aws.amazon.com/AWSEC2/latest/User-guide/EBSVolumeTypes.html
- •S3 storage classes
 - https://aws.amazon.com/s3/storage-classes/?nc=sn&loc=3



Gibibyte vs. Gigabyte

Decimal Name	Decimal Abbr.	Decimal Power	Decimal Value	Binary Name	Binary Abbr.	Binary Power	Binary Value
Kilobyte	kB	10^3	1,000	Kibibyte	kiB	2^10	1,024
Megabyte	MB	10^6	1,000,000	Mebibyte	MiB	2^20	1,048,576
Gigabyte	GB	10^9	1,000,000,000	Gibibyte	GiB	2^30	1,073,741,824
Terabyte	TB	10^12	1,000,000,000,000	Tebibyte	TiB	2^40	1,099,511,627,776

