Amazon Web Services

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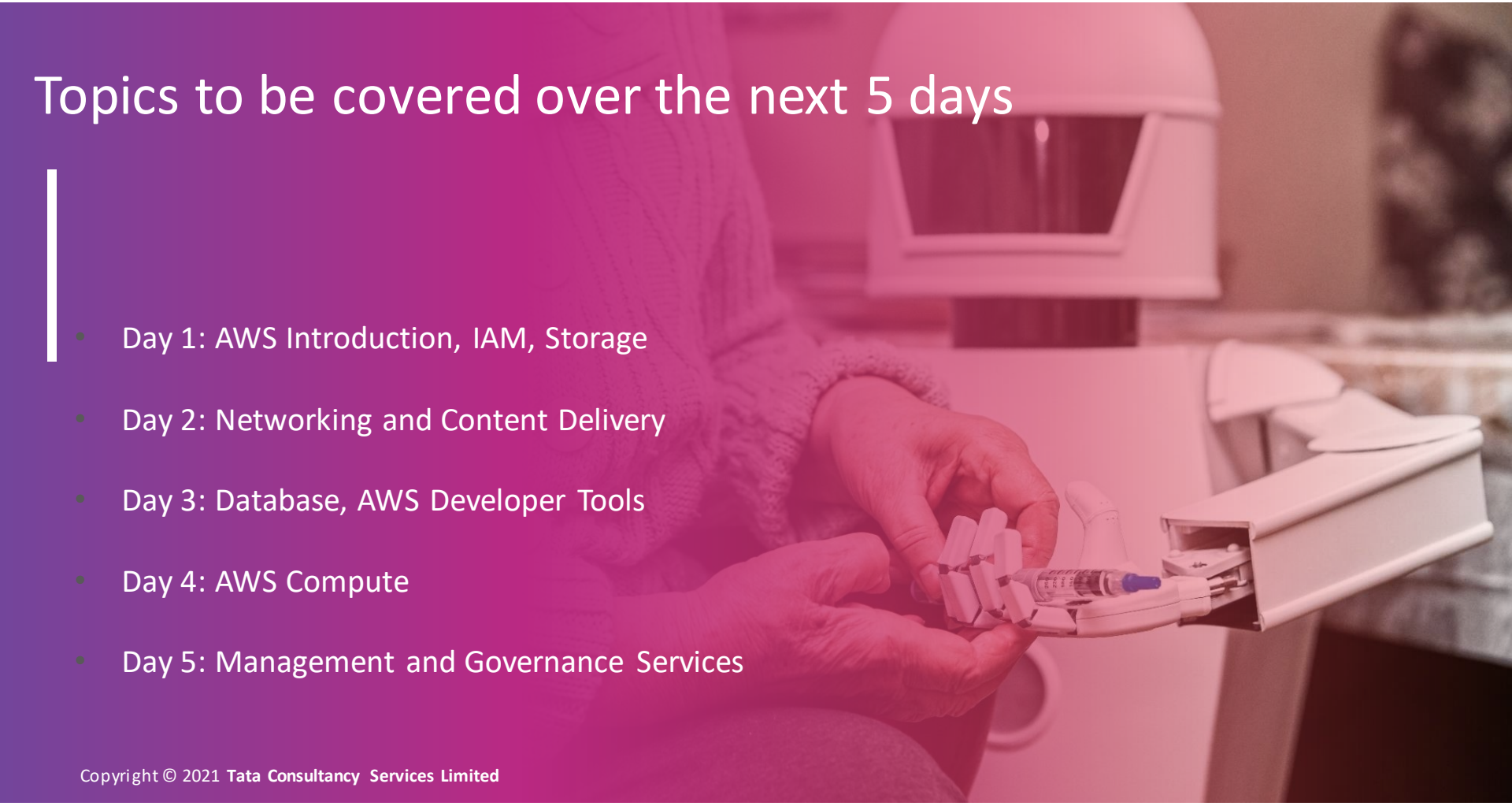
Topics to be covered over the next 5 days



- Day 1: AWS Introduction, IAM, Storage
- Day 2: Networking and Content Delivery
- Day 3: Database, AWS Developer Tools
- Day 4: AWS Compute
- Day 5: Management and Governance Services

Day 1

AWS Introduction, IAM, Storage

What is AWS?

- Amazon - initially online retailer
- Amazon Web Services (AWS) started in March 13,2006
- Amazon converted the unused storage infrastructure as business “Simple Storage Service” S3.
- By the end of 2006, Elastic Compute Cloud (EC2) was launched.
- Today, AWS is the largest Public Cloud service provider offering 200+ web services including IaaS and PaaS services
- AWS is a secure and highly scalable cloud services platform offering compute power, database storage, content delivery and other functionality to help businesses scale and grow.
- No upfront payments. Pay as you go model.

Creating an AWS Account

- https://aws.amazon.com/premiumsupport/knowledge-center/create-and-activate-aws-account/
- https://aws.amazon.com/free/

AWS Budget Setup

- https://signin.aws.amazon.com/signin

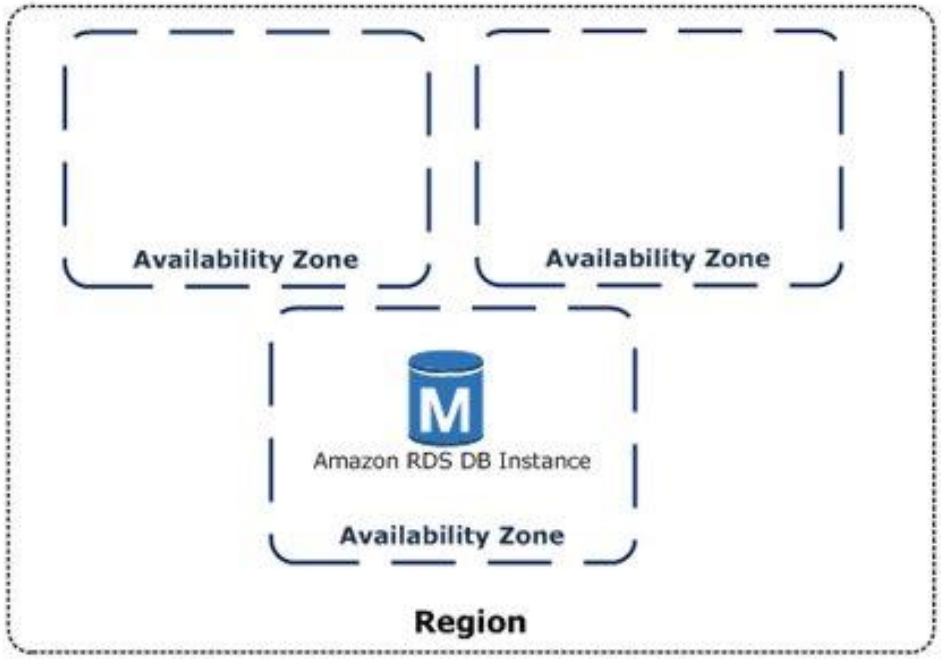
AWS Regions and AZs

- **Region** :
  - Choose a region based on data regulations and compliance, distance from customer's DCs/Offices
  - Some AWS services may not be available in certain Regions yet
  - Pricing for AWS services in each region may differ
  - All communication between regions is across the public Internet

- **Availability Zone :**
  - Availability Zones are distinct datacenters within a region. There are 2 or more AZs in every Region.
  - AZs in the same Region are isolated from failures, but connected over high speed, low latency private link.
  - Deploy your application across AZs in a Region for High Availability
  - An AZ is represented by a region code followed by a letter identifier, e.g. us-east-1a

- https://aws.amazon.com/about-aws/global-infrastructure/

AWS Regions and AZs



IAM

- AWS Identity and Access Management (IAM) is a web service that helps you securely control access to AWS resources for users of your AWS account.
- IAM can control who can use your AWS resources (authentication) and what resources they can use and in what ways (authorization).
- Granular permission
- Identity Federation
- Multi-factor Authentication
- Can provide temporary security credentials to provide access to Users /Applications / AWS services
- Setup your own Password Policy
- Integrate with many different AWS services
- Supports PCI DSS Compliance - e.g. required for online payments, storing credit card details

IAM

- IAM is Global, universally applicable and not tied to Region
- You can define access to the below components through:
  - IAM Policies: Define what each of the below can and cannot do.
    - JSON Scripts
- The main components are :
  - IAM Users : Physical Person that gets an account
  - IAM Groups : Users are grouped according to
    - Functions(Admin, Devops)
    - Teams(Engineering, Design)
  - IAM Roles : Only meant for internal usage within AWS Resources

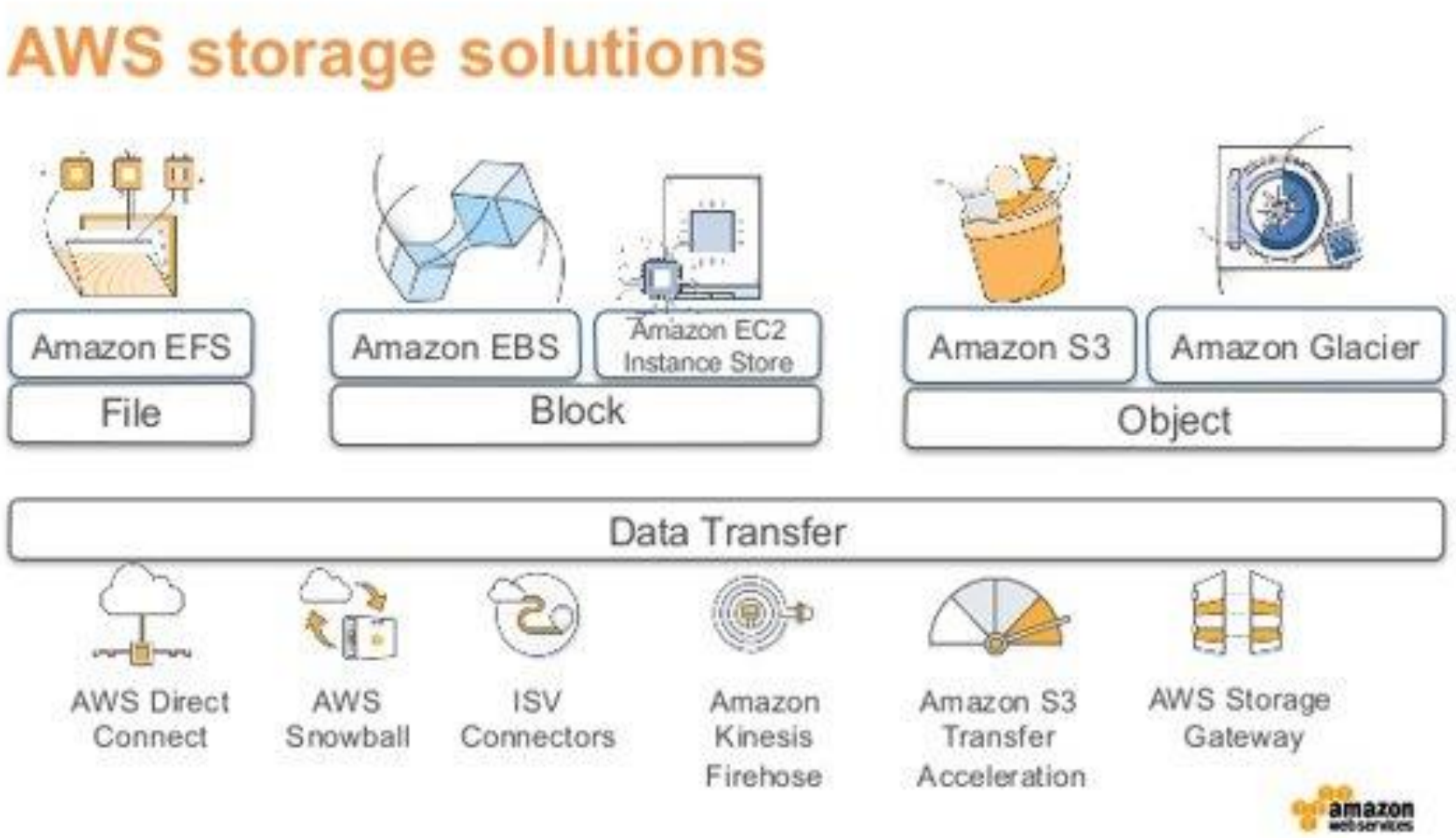
– https://aws.amazon.com/iam/

IAM - Advanced

- AWS Security Token Services : Limited and temporary access to AWS resources.
- Identity Federation : Used for giving access to Users outside AWS/ Non SAML Active Directory mergers
- SAML 2.0 Federation : Active Directory Merger in AWS Account; Needs to setup a trust between AWS IAM and SAML (both ways);
  - https://aws.amazon.com/blogs/security/enabling-federation-to-aws-using-windows-active-directory-adfs-and-saml-2-0/
- AWS Cognito : Allow access for users from mobile/web apps
- AWS Organizations : Allows to manage multiple AWS root accounts through Service Policies (SCP) and consolidated billing.
  - https://docs.aws.amazon.com/organizations/latest/userguide/orgs_getting-started_concepts.html

https://docs.aws.amazon.com/IAM/latest/UserGuide/access_policies_boundaries.html

Storage



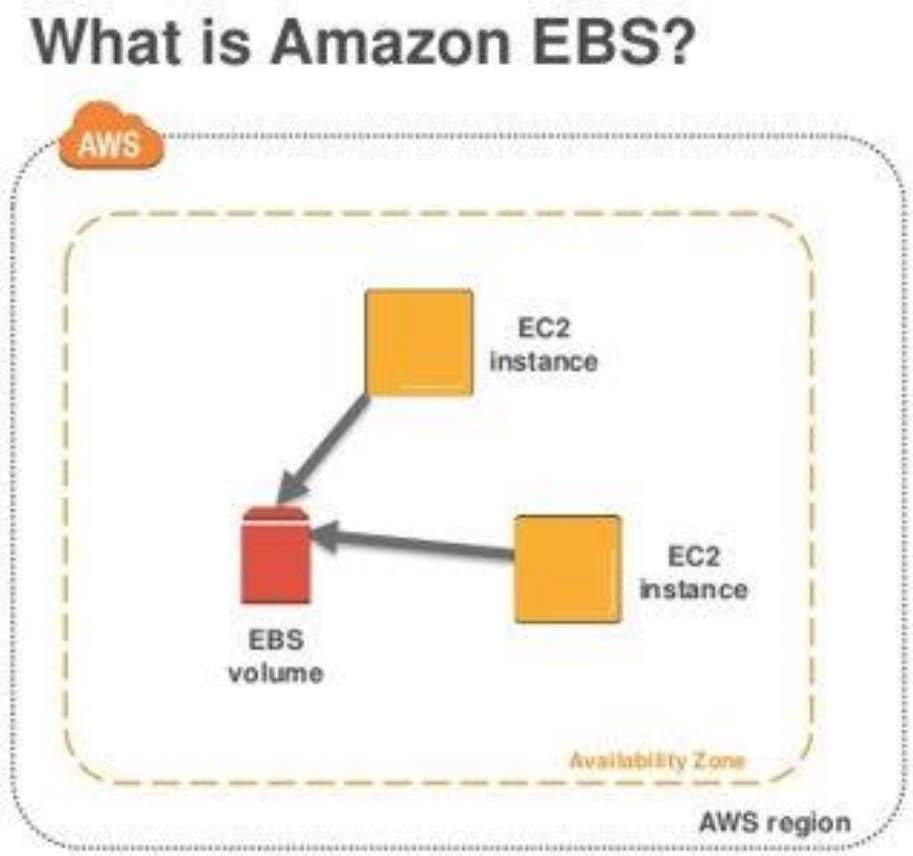
S3: Simple Storage Service

- S3 provides developers and IT teams with secure, durable, highly scalable object storage.
- Amazon S3 is easy to use, with a simple web services interface to store and retrieve any amount of data from anywhere on the web.
- The very first offering of Amazon Cloud
- Users or applications can store or retrieve objects on S3. You can also use S3 to store backup of your files either directly uploading the files or taking backup dump of say database and uploading the dump.
- You can also enable versioning on S3 buckets to maintain versions for the objects that you upload and also safeguard against accidental deletion.
- S3 is also used for hosting static websites and storing flat files in bulk with easy indexing achieved through metadata tags & unique identifiers

S3: Buckets and Objects

- A **Bucket** is a Container for objects stored in Amazon S3.
  - Every **Object** is contained in a Bucket (A bucket can be a assumed to be a *Directory* and an object a *File*)
  - Every Bucket has a globally unique name
  - Defined at Region Level
  - Naming Convention: No uppercase, No underscore, 3-63 characters long, Not an IP
- An **Object** has a **Key**.
  - Key is the FULL PATH:
    - <Bucket_Name>/Folder1/Folder2/File.txt
  - Object **Values** the File Content
  - Max Size: 5TB, More than 5GB uploaded through “Multi-Part Upload”
  - Version Ids will be visible if versioning is enabled

EBS: Elastic Block Store



- Availability Zone specific
- Persist independently of the EC2 instance

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EBS: Elastic Block Store

- EBS is an Attached Volume which allows your instances to persist data
- Network Drive(Not a Physical Drive)
- Can be detached from 1 instance to another(in same AZ)
- To move across an AZ or a region, you first need a snapshot
- https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ebs-volume-types.html

Amazon Elastic Block Storage (EBS)

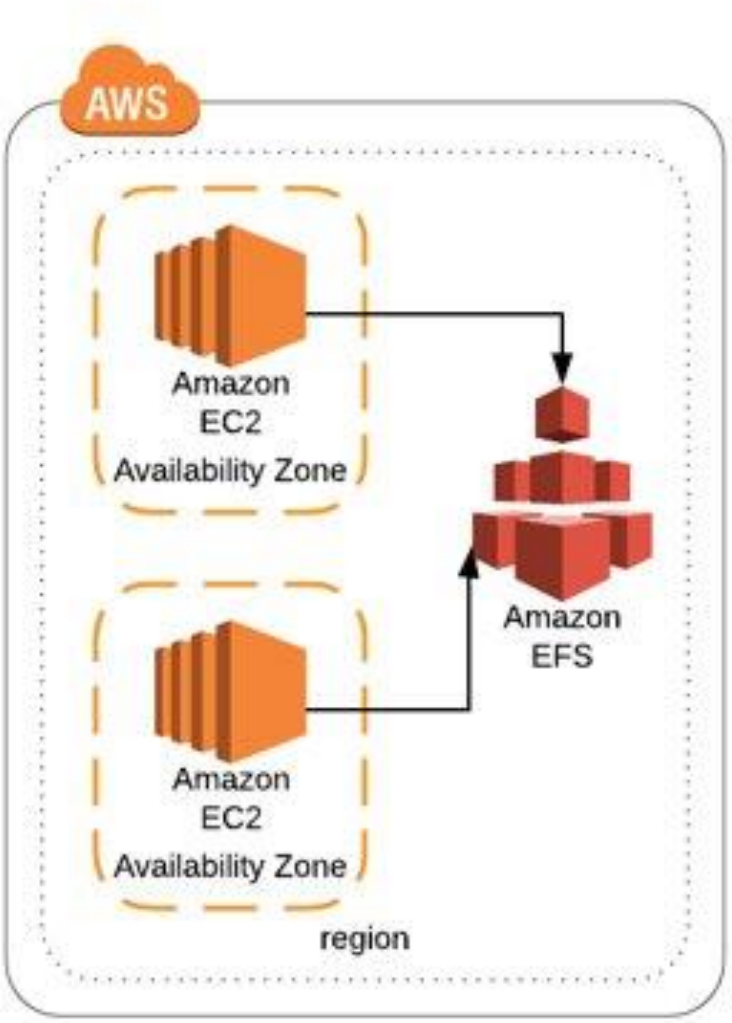
EBS: Elastic Block Store

	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
Use Cases	• Recommended for most workloads • System boot volumes • Virtual desktops • Low-latency interactive apps • Development and test environments	• Critical business applications that require sustained IOPS performance, or more than 16,000 IOPS or 250 MiB/s of throughput per volume • Large database workloads, such as: • MongoDB • Cassandra • Microsoft SQL Server • MySQL • PostgreSQL • Oracle	• Streaming workloads requiring consistent, fast throughput at a low price • Big data • Data warehouses • Log processing • Cannot be a boot volume	• Throughput-oriented storage for large volumes of data that is infrequently accessed • Scenarios where the lowest storage cost is important • Cannot be a boot volume
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 per Volume	16,000 (16 KiB I/O) *	64,000 (16 KiB I/O) †	500 (1 MiB I/O)	250 (1 MiB I/O)
Max Throughput per	250 MiB/s *	1,000 MiB/s †	500 MiB/s	250 MiB/s

EFS: Elastic File System

- Amazon Elastic File System (Amazon EFS) provides fully managed File system as a web service
- Simple, scalable file storage for use with Amazon EC2.
- With Amazon EFS, storage capacity is elastic, growing and shrinking automatically as you add and remove files, so your applications have the storage they need, when they need it.
- Supports the Network File System version 4.1 (NFSv4.1) protocol.
- Share file storage access across instances
- Support for thousands of concurrent NFS connections
- Highly available and durable
- Consistent low latency, Scalable Performance
- Low Cost and Secure
- Every file system object (i.e. directory, file, and link) is redundantly stored across multiple Availability Zones.

EFS: Elastic File System



EFS Performance Modes

- To support a wide variety of cloud storage workloads, Amazon EFS offers two performance modes.
- You select a file system's performance mode when you create it.

- General Purpose Performance Mode
  - Use this mode for the majority of your Amazon EFS file systems. General Purpose is ideal for latency-sensitive use cases, like web serving environments, content management systems, home directories, and general file serving.

- Max I/O Performance Mode
  - File systems in the Max I/O mode can scale to higher levels of aggregate throughput and operations per second with a tradeoff of slightly higher latencies for file operations. Highly parallelized applications and workloads, such as big data analysis, media processing, and genomics analysis, can benefit from this mode

EFS Use Cases

- Amazon EFS is designed for a broad range of use cases, such as…
  - Content repositories
  - Development environments
  - Home directories
  - Web server farms
  - Big Data

Thank You