

Storage

STORAGE TYPES · AMAZON EBS · AMAZON S3 · AMAZON EFS · AMAZON S3 GLACIER · LIFECYCLE POLICIES

STUDY & REVIEW

01 MUST KNOW

if you remember five things, remember these

- 01 The chooser: instance store** = ephemeral (dies with the instance) · **EBS** = persistent block storage, mounted by **one** EC2 instance at a time in the **same AZ** · **EFS** = shared NFS file system many instances mount at once · **S3** = object storage reachable from anywhere by URL · **S3 Glacier** = cold archive for rarely accessed data.
- 02 Block vs. object:** change one character in a 1-GB file — block storage rewrites only the **block** that changed; object storage re-uploads the **entire file**. Block (EBS) is faster and uses less bandwidth but costs more than object (S3).
- 03 EBS essentials:** volumes are automatically **replicated within their AZ**; backups are **snapshots to S3** — first is the **baseline**, the rest capture only changes; encryption costs nothing extra; volumes resize or change type (HDD↔SSD, 50 GB→16 TB) **dynamically, without stopping the instance**.
- 04 S3 numbers:** designed for **11 9s of durability**; Standard adds **four 9s of availability** (Standard-IA: three 9s); single object limit **5 TB**; bucket names are **globally unique** and DNS-compliant; everything is **private by default**.
- 05 Glacier retrievals:** **expedited 1–5 minutes** (highest cost) · **standard 3–5 hours** · **bulk 5–12 hours** (lowest cost). Archives up to **40 TB**, encrypted at rest **by default**, 11 9s durability, **Vault Lock** enforces compliance policy.

02 KEY TERMS

TERM	DEFINITION
Block storage	Data in blocks; edits rewrite only changed blocks — fast, low bandwidth, higher cost (EBS)
Object storage	File + metadata stored whole; any change re-uploads the entire object (S3, Glacier)
Instance store	Ephemeral storage attached to an EC2 instance — temporary, non-persistent
EBS snapshot	Point-in-time volume backup to S3; incremental after the baseline; copyable across Regions
Bucket	S3 container for objects, created in a chosen Region; name globally unique + DNS-compliant
Object	Data + descriptive metadata, addressed by URL; up to 5 TB in S3
Lifecycle policy	S3 rule that moves or deletes objects by age across storage classes (per bucket or per object)
Mount target	EFS's NFS endpoint in a VPC subnet — one per Availability Zone; mount by IP or DNS name
Archive	Base storage unit of S3 Glacier (any object, up to 40 TB); unique ID + optional description
Vault	Glacier container for archives; each holds one access policy + one lock policy
Vault Lock	Glacier policy that makes a vault unalterable — compliance controls like SEC Rule 17a-4(f)
Provisioned IOPS SSD	Highest-performance EBS volume type; you pay for the IOPS you provision

03 THE STORAGE CHOOSER

the module's whole point — know this table cold

SERVICE	TYPE	ACCESS & LIMITS	DURABILITY & NOTES
Instance store	Block · ephemeral	Attached to one EC2 instance; data gone when instance stops	Temporary scratch only
Amazon EBS	Block · persistent	One instance at a time, same AZ only; like an external hard drive	Auto-replicated within its AZ; snapshot backups to S3
Amazon S3	Object	From anywhere via URL (HTTP/HTTPS), console, CLI, SDK, VPC endpoint	11 9s durability; objects ≤ 5 TB; redundant across multiple facilities

SERVICE	TYPE	ACCESS & LIMITS	DURABILITY & NOTES
Amazon EFS	File (NFS v4.0/4.1)	Thousands of EC2 instances concurrently, across AZs in a Region; Linux AMIs	Petabyte-scale; grows/shrinks automatically
S3 Glacier	Object · archive	Retrieval in minutes to hours (expedited / standard / bulk)	11 9s durability; archives ≤ 40 TB; encrypted by default

04 EBS VOLUME TYPES & BILLING

match the technology to the workload to cut cost

VOLUME TYPE	BOOT VOLUME?	CHARACTER	HOW IT'S BILLED
General Purpose SSD	Yes	Usually sufficient for most workloads	GB provisioned per month; I/O included in price
Provisioned IOPS SSD	Yes	Highest performance available	GB provisioned plus provisioned IOPS × % of days provisioned
Magnetic (HDD)	No	Lower cost — extra storage, non-boot uses	GB provisioned; I/O charged per request

05 S3 STORAGE CLASSES

six classes, one axis: how often you touch the data

CLASS	DESIGNED FOR
S3 Standard	Frequent access — 11 9s durability, four 9s availability; low latency, high throughput; websites, content distribution, big data analytics
S3 Intelligent-Tiering	Unknown or changing access patterns — auto-moves objects idle 30 days to the infrequent tier (and back on access); no retrieval fee, small per-object monitoring fee
S3 Standard-IA	Infrequent access, rapid when needed — Standard's durability/throughput at a low GB price + per-GB retrieval fee; three 9s availability; long-term storage, backups, DR
S3 One Zone-IA	Infrequent, re-creatable data — single AZ (other classes use ≥ 3), cheaper than Standard-IA; secondary backups, cross-Region replication targets
S3 Glacier	Archiving — retrieval in minutes to hours; upload directly or arrive via lifecycle policy
S3 Glacier Deep Archive	Lowest-cost class — data touched once or twice a year, kept 7–10+ years; restore within 12 hours; tape replacement

06 AMAZON S3 VS. AMAZON S3 GLACIER

both object stores — very different jobs

AMAZON S3 <i>frequent, low-latency access</i> — Max single object 5 TB — Charges per PUT, COPY, POST, LIST, GET request — Higher storage cost per GB — Encryption at rest: your application must enable SSE (SSE-S3 / SSE-C / SSE-KMS)	AMAZON S3 GLACIER <i>lowest-cost long-term archive</i> — Max single archive 40 TB — Charges per UPLOAD and retrieval request — retrievals cost more — Extremely low storage cost (priced by Region) — Encrypted at rest by default — AES-256, keys managed for you — Retrievals: expedited 1–5 min · standard 3–5 h · bulk 5–12 h
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07 LIFECYCLE POLICY: AN OBJECT AGES OUT

rules set per bucket or per object — movement is automatic

01 Uploaded to **S3 Standard** → **02** After 30 days: **Standard-IA** → **03** After 30 more days: **S3 Glacier** → **04** After 1 year: **deleted**

- × “An EBS volume can be attached to several instances at once.” — **One** EC2 instance at a time, and only within the **same Availability Zone**. Shared access is EFS's job.
- × “EBS replicates my volume across AZs.” — Replication is **within a single AZ** only. For cross-Region protection, **copy snapshots** to another Region.
- × “Every EBS snapshot is a full copy.” — Only the **baseline** is. Every later snapshot stores just the difference from the previous one.
- × “Any EBS volume type can boot an instance.” — Only **SSD** types (General Purpose, Provisioned IOPS). Magnetic volumes are for additional storage.
- × “S3 charges for all data transfer.” — Transfer **IN is free**, and OUT to CloudFront or EC2 **in the same Region** is free. You pay when data crosses the Region boundary outbound.
- × “S3 encrypts my objects at rest by default.” — In this course's comparison, **Glacier** encrypts by default; in **S3 your application must enable** server-side encryption.
- × “Bucket names must be unique within my account.” — Bucket names are unique across **all of Amazon S3 globally**, and must be DNS-compliant.
- × “One Zone-IA is just cheaper Standard-IA.” — It keeps data in a **single AZ** while other classes use at least three; use it only for re-creatable or secondary-copy data.

09 SELF-QUIZ

answers are upside-down below

- Q1** Which EC2-attached storage is temporary and lost when the instance powers down?
- Q2** Where must an EBS volume live relative to the EC2 instance that mounts it?
- Q3** Name the three EBS volume types.
- Q4** After the baseline, what does each subsequent EBS snapshot record?
- Q5** What durability is S3 designed for, and how large can one object be?
- Q6** Which S3 class holds data in a single Availability Zone?
- Q7** Which S3 class automatically shuffles objects between access tiers as usage changes?
- Q8** What protocol does EFS speak, and which AML family supports it?
- Q9** List Glacier's three retrieval options with their time ranges.
- Q10** Sample CCP exam: a company wants cost-effective storage for data that is not frequently accessed — Storage Gateway, S3 Glacier, EBS, or S3?

ANSWER KEY (rotate the page)

Q1 instance store (ephemeral storage) **Q2** in the same Availability Zone **Q3** General Purpose SSD, Provisioned IOPS SSD, Magnetic **Q4** only the changes since the previous snapshot (incremental) **Q5** 11 9s; up to 5 TB **Q6** S3 One Zone-IA **Q7** S3 Intelligent-Tiering **Q8** NFS v4.0/4.1; Linux-based AMLs **Q9** expedited 1–5 min, standard 3–5 h, bulk 5–12 h **Q10** Amazon S3 Glacier