



CLOUD COMPUTING APPLICATIONS

Cloud Storage: Archive Storage and Backup
Prof. Reza Farivar

Cloud Archive Storage

- The availability of the storage has a direct impact on costs
- If you know file requests are very infrequent, you can store them in cold storage
- Cloud providers offer archive storage at much reduced costs
 - However, access to them is relatively expensive
- Different tiers of archive storage

Amazon Archive Storage: S3 Glacier

- AWS S3 Glacier
 - \$0.004 per GB / mo
 - Compare with S3
 - Frequent access tier: \$0.023 per GB / mo
 - Infrequent access tier: \$0.0125 per GB / mo

** Prices and bandwidths are a snapshot in time, might be different now*

- Glacier Retrieval
 - retrieval option from 1 minute to 12 hours

Retrieval Time	Data Retrievals
Expedited (typically available within 1 – 5 minutes)	\$0.03 per GB / mo
Standard (typically accessible within 3 – 5 hours)	\$0.01 per GB / mo
Bulk	\$0.0025 per GB / mo

- Retrieval request

Retrieval Time	Retrieval Requests
Expedited	\$10.00 per 1,000 requests
Standard	\$0.05 per 1,000 requests
Bulk	\$0.025 per 1,000 requests

- S3 Glacier Deep Archive
 - For long-term data archiving that is accessed once or twice in a year and can be restored within 12 hours
 - \$0.00099 per GB / mo

AWS S3 tiers comparison

	S3 Standard	S3 Intelligent-Tiering*	S3 Standard-IA	S3 One Zone-IA†	S3 Glacier	S3 Glacier Deep Archive
Designed for durability	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)
Designed for availability	99.99%	99.9%	99.9%	99.5%	99.99%	99.99%
Availability SLA	99.9%	99%	99%	99%	99.9%	99.9%
Availability Zones	≥3	≥3	≥3	1	≥3	≥3
Minimum capacity charge per object	N/A	N/A	128KB	128KB	40KB	40KB
Minimum storage duration charge	N/A	30 days	30 days	30 days	90 days	180 days
Retrieval fee	N/A	N/A	per GB retrieved	per GB retrieved	per GB retrieved	per GB retrieved
First byte latency	milliseconds	milliseconds	milliseconds	milliseconds	select minutes or hours	select hours
Storage type	Object	Object	Object	Object	Object	Object
Lifecycle transitions	Yes	Yes	Yes	Yes	Yes	Yes

Service	Cost per 1TB / month
AWS EFS	\$300
AWS FSx Lustre	\$290
EBS gp2	\$100
AWS EFS infrequent access	\$25
S3 standard	\$23
S3 infrequent	\$13
S3 Glacier	\$4
S3 Glacier deep archive	\$1

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Cloud-managed Backups

- Some cloud providers allow managed backups from their block stores or managed file systems or other data stores
 - Distributed Backup is not a simple task

- Example: Amazon backup

Resource Type	Warm Storage	Cold Storage
Amazon EFS File System Backup	\$0.05 per GB-Month	\$0.01 per GB-Month
Amazon EBS File System Backup	\$0.05 per GB-Month	n/a†
Amazon RDS Database Snapshot	\$0.095 per GB-Month	n/a†
Amazon DynamoDB Table Backup	\$0.10 per GB-Month	n/a†
AWS Storage Gateway Volume Backup	\$0.05 per GB-Month	n/a†

- Amazon restore

Resource Type	Warm Storage	Cold Storage	Item-level Restore
Amazon EFS File System Backup	\$0.02 per GB	\$0.03 per GB	\$0.5 per request
Amazon EBS Volume Snapshot	Free	n/a†	n/a**
Amazon RDS Database Snapshot	Free	n/a†	n/a**
Amazon DynamoDB Table Backup	\$0.15 per GB	n/a†	n/a**
AWS Storage Gateway Volume Backup	Free	n/a†	n/a**

- Example: Azure

- Only supports backups of VMs (block stores) and SQL workloads

