Task #4

ex#1

Object storage

Object storage stores data as independent objects that are accessed through an API, without a real folder structure. It is suitable for cloud environments and for storing large amounts of unstructured data.

Advantages:

- Can easily handle growth in data and users (**scalability**)
- High reliability due to data replication
- Cost-effective for large files and backups

Disadvantages:

- Does not support partial file updates
- Slower access compared to block storage

File storage

File storage uses a traditional file and folder structure that is shared between multiple machines. Applications can access it like a regular filesystem.

Advantages:

- Familiar structure and easy to use
- Supports partial file reads and writes

Disadvantages:

- Harder to handle large growth (**scalability**)
- Less suitable for cloud-native systems

Block storage

Block storage presents data as virtual disks attached to servers and is mainly used for performance-critical systems.

Advantages:

- Fast access and high performance
- Suitable for databases

Disadvantages:

- Limited ability to grow easily (**scalability**)
- Usually attached to a single server

ex#2

S3 (Amazon Simple Storage Service) is a cloud storage service provided by Amazon Web Services (AWS). The service allows you to store and retrieve data widely, especially for large files like images, videos, backups, logs, and more.

Benefits of S3

- **Scalability** – You can expand storage almost without limit, according to your needs.
- **High Availability** – The service allows access to data at any time and from anywhere.
- **Security** – You can set access permissions and security measures like encryption.
- **Widespread Use** – Many companies use S3 to store information, backups, and transfer files over the internet.

In general, if you need to store a large amount of data easily, with flexibility and the ability to scale as needed, S3 is an excellent service.

ex#3

A **Bucket** in Amazon S3 is a container for storing files (objects). It's like a folder, but with a few differences:

1. **Unique Name** – Every Bucket must have a unique name worldwide.
2. **Data Storage** – You store files (images, videos, documents, etc.) inside it.
3. **Folder Hierarchy** – You can organize files inside the Bucket like folders by using "/" in file names.
4. **Access Permissions** – Each Bucket has its own access permissions that you can configure.

In short, a **Bucket** is a place where you store your files in S3, with unique names and independent access settings.

ex#4

No, in S3 there are no **real folders** like in traditional file systems. However, you can **simulate folders** by using `/` in the file names. This allows for easy and organized structuring of files, and it's also efficient for later retrieval based on categories (like `folder1/`). This way, you can easily organize files and retrieve them in an orderly fashion based on their names.

ex#5

Yes, S3 has limitations, but they are different from traditional file systems:

- **Individual File Size**: Up to 5 terabytes per file, with no limit on the total size of the bucket or the number of files.
- **Limitations in traditional file systems**: There are file size limitations (usually up to a few terabytes), and physical disk size limitations.
- **Scalability**: S3 offers scalable storage, while traditional file systems have physical limits.
- **Performance**: S3 may have potential latencies due to communication with AWS servers, while local file systems offer direct and faster access.

ex#6

What implementations of S3 exist?

There are several **S3-like services** and **object storage solutions** that are compatible with the S3 API. Here are some examples:

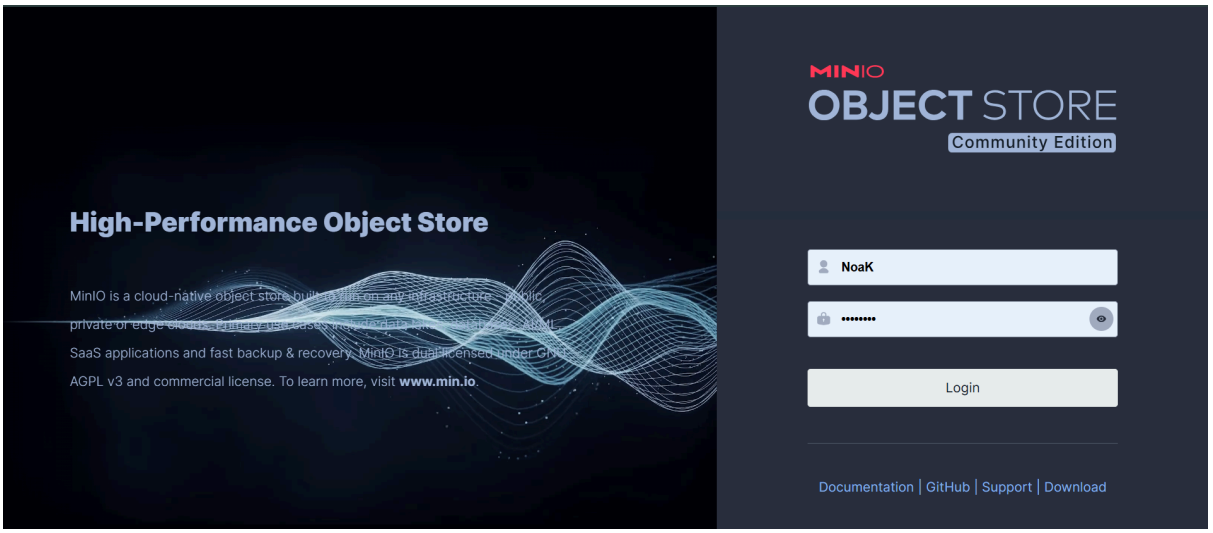
1. **Amazon S3** – The official object storage service from Amazon.
2. **MinIO** – An open-source object storage solution compatible with S3, allowing you to set up a local or private storage server.
3. **Wasabi** – A cloud storage service offering a cheaper alternative to S3 with S3 API support.
4. **DigitalOcean Spaces** – An object storage service from DigitalOcean that supports the S3 API.
5. **Backblaze B2** – An object storage service compatible with S3, offering a low-cost cloud storage solution.
6. **IBM Cloud Object Storage** – IBM's object storage service that supports the S3 API.
7. **Google Cloud Storage** – Google's cloud storage service that supports the S3 API and provides similar object storage solutions.

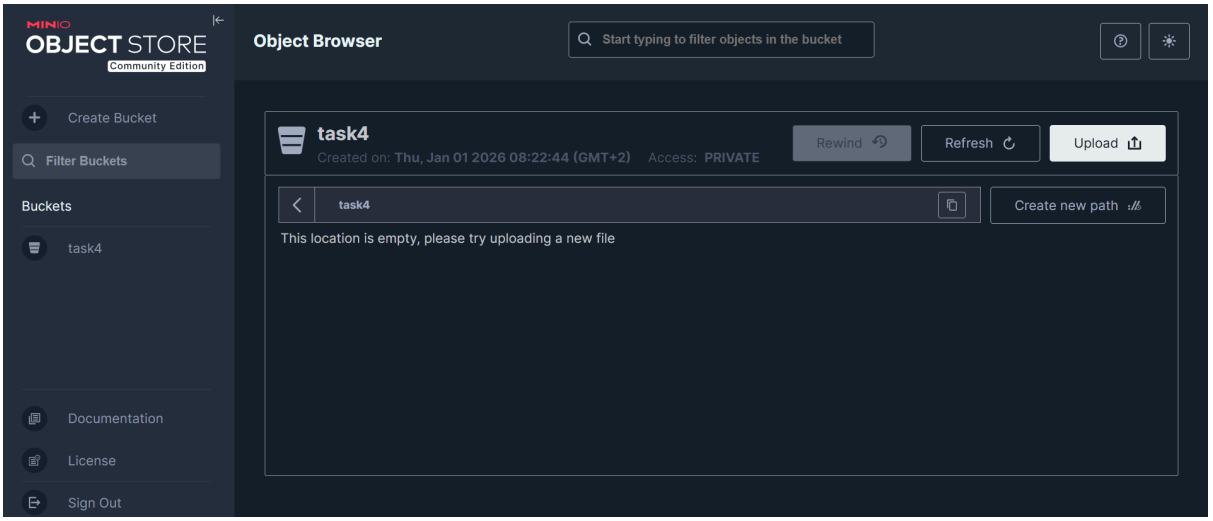
These services support the S3 API, so you can use them in a similar way to Amazon S3, with additional features or benefits such as lower costs or tailored performance.

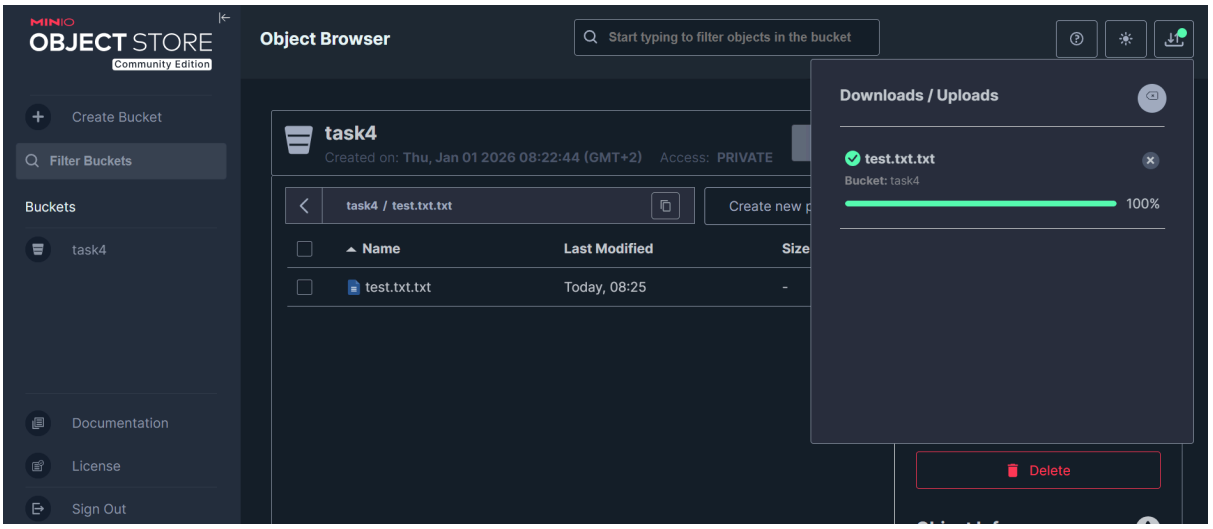
ex#7

```
C:\Users\876\Downloads\task4\ex7\minio\data>docker run -d -p 9000:9000 -p 9001:9001 --name minio -v C:\Users\876\Downloa
ds\task4\ex7\minio\data:/data -e MINIO_ROOT_USER=NoaK -e MINIO_ROOT_PASSWORD=@4110803 minio/minio server /data --console
-address ":9001"
b2c738bc62199725bf68b9ab27ec3f1806a2354cf05b6e8e7c2351807588a97f

C:\Users\876\Downloads\task4\ex7\minio\data>docker ps
CONTAINER ID   IMAGE         COMMAND                  CREATED         STATUS         PORTS
                NAMES
b2c738bc6219   minio/minio   "/usr/bin/docker-ent…"   9 seconds ago   Up 8 seconds   0.0.0.0:9000-9001->9000-9001/tcp, [
::]:9000-9001->9000-9001/tcp   minio
```




MINIO
OBJECT STORE
Community Edition
Object Browser
Start typing to filter objects in the bucket
Create Bucket
Filter Buckets
Buckets
task4
Documentation
License
Sign Out
task4
Created on: Thu, Jan 01 2026 08:22:44 (GMT+2)
Access: PRIVATE
Rewind
Refresh
Upload
task4
Create new path
This location is empty, please try uploading a new file


MINIO
OBJECT STORE
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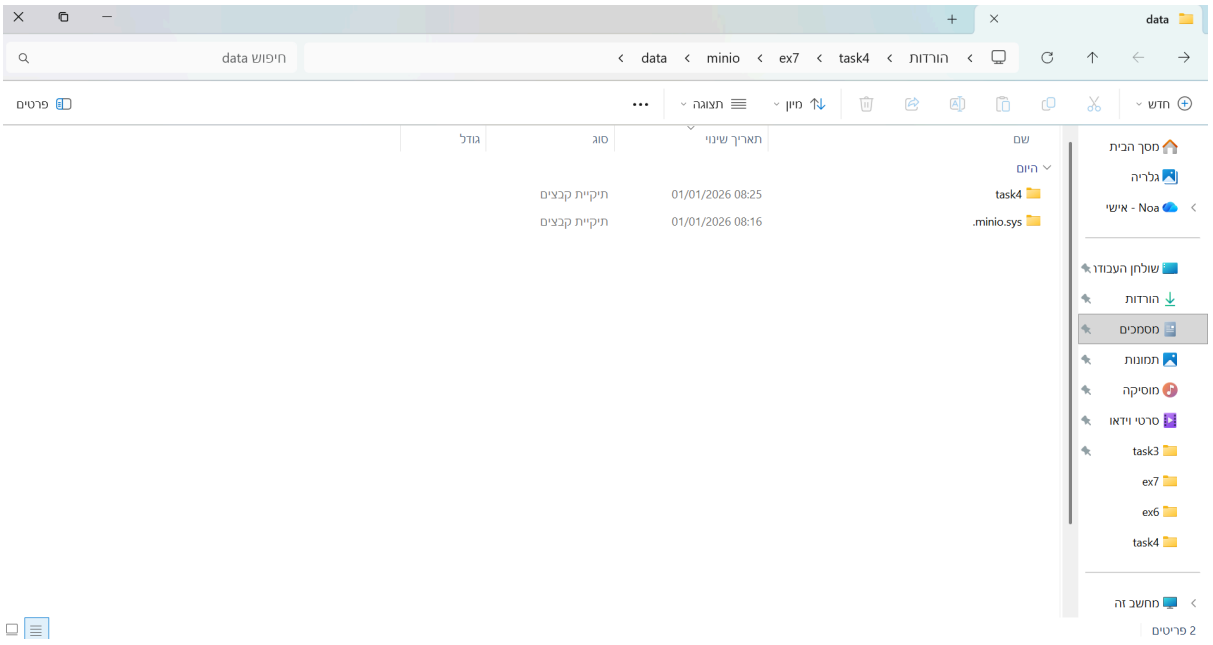
Buckets
task4
Documentation
License
Sign Out
task4
Created on: Thu, Jan 01 2026 08:22:44 (GMT+2)
Access: PRIVATE
task4 / test.txt.txt
Create new p
Name
Last Modified
Size
test.txt.txt
Today, 08:25
-
Downloads / Uploads
test.txt.txt
Bucket: task4
100%
Delete


data
חיפוש data
data
minio
ex7
task4
הורדות
פרטים
מיין
תצוגה
חדש
שם
תאריך שינוי
סוג
גודל
היום
task4
01/01/2026 08:25
תיקיית קבצים
.minio.sys
01/01/2026 08:16
תיקיית קבצים
מסך הבית
גלריה
Noa - אישי
שולחן העבודה
הורדות
מסמכים
תמונות
מוסיקה
סרטי וידאו
task3
ex7
ex6
task4
מחשב זה
2 פריטים

ex#8

The code has been uploaded to Git

The run:

```
PS C:\Users\876\Downloads\task4\ex8> python minio_client.py
Created object: file_567.txt with content: wyHk860WsH3owObc6wI8
Created object: file_523.txt with content: dAmg2XHS6daQFo6Ynb2q
Objects in bucket:
- file_523.txt
- file_567.txt
- file_gkkzh.txt
- file_z9ip0.txt
- test.txt.txt
reading data of object: file_567.txt
Data: wyHk860WsH3owObc6wI8
Deleted object: file_523.txt
reading data of updated object: file_567.txt
Data: Updated content1: uyz8DuqsXwdaicfSSKS8
PS C:\Users\876\Downloads\task4\ex8>
```

After the run: