**Storage In Oracle Cloud (OCI) – Block, Object (Standard & Archive), File & NVMe**

**Storage**is one of the 5 pillars on which OCI is built. Data like transactional data, Compute images, backup of databases, OS, Data from compute instances, etc are stored in storage service of OCI

## **Overview Of Storage Service**

OCI provides Storage service for storing data. OCI also provides various services like for securing the data stored in storage service and making this data highly available and recover data in failover conditions.

**Oracle Cloud Infrastructure offers three main storage service**

### **Block Volume Service**

* Block storage operates at the raw storage device level and manages data as a set of numbered, fixed-size blocks using protocols such as iSCSI.
* Block Volume Service lets you dynamically provision and manage block storage volumes.



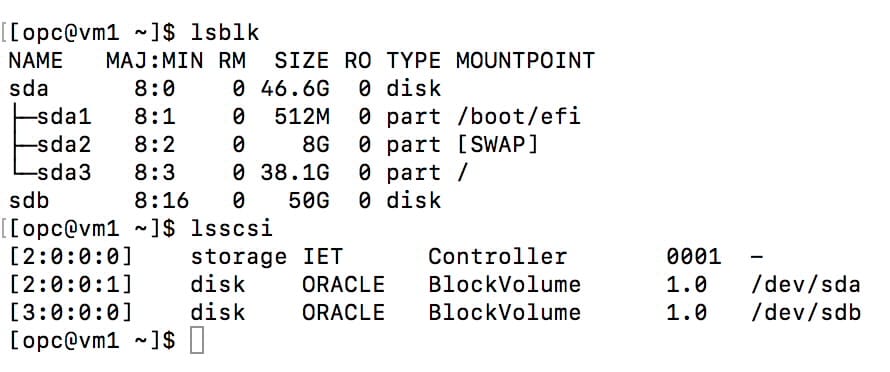
**Volume**:

* + **Block Volume**: A detachable block storage device that allows you to dynamically  
    expand the storage capacity of an instance
  + **Boot volume**: A detachable boot volume device that contains the image used to boot  
    a compute instance.
* We can attach Block volume to instances or databases for storing data.
* You can create, attach, connect, and move volumes, as needed, to meet your storage and application requirements.
* Volume sizes go from 50GB to 32TB in 1GB increments.

Oracle has introduced a new feature of **Shareable Block Volume**so that you can attach a single block volume to multiple instances. There are two modes to do this **Read/Write**mode & **Read** mode.

**Difference between ISCSI and Paravirtualised mode:**

Once you attach the volume, it is ready to use right away, in this example /dev/sdb. No more iSCSI configuration!



Extending block storage:

Increase the size of volume from console through edit option

Next run rescan commands

sudo dd iflag=direct if=/dev/sdb of=/dev/null count=1

echo "1" | sudo tee /sys/class/block/sdb/device/rescan

After you have created the mount point run one of the following commands to grow the file system.

For **XFS** file systems:

Copy

xfs\_growfs -d *<directory\_name>*

*<directory\_name>* is the name for the directory you created in the previous step, for example data.

For **ext\*** file systems:

Copy

resize2fs *<partition\_id>*

# Replicating a Volume

The Block Volume service provides you with the capability to perform ongoing automatic asynchronous replication of block volumes, boot volumes, and volume groups to other regions and availability domains.

There are two types of replication:

* [Cross region](https://docs.oracle.com/en-us/iaas/Content/Block/Concepts/volumereplication.htm#volumereplication_topic-Cross_Region_Replication), for replication between regions.
* [Cross availability domain](https://docs.oracle.com/en-us/iaas/Content/Block/Concepts/volumereplication.htm#volumereplication_topic-Cross_AD_Replication), for replication between availability domains within the same region.

This feature supports the following scenarios without requiring volume backups and volume group backups:

* Disaster recovery
* Migration
* Business expansion

The replication feature is complementary to the backup feature, not a replacement. Backups give you a point-in-time snapshot of volumes that enables you to return to a previous version of a volume or volume group. Replicas give you the current version of the data.

When you enable replication for a volume or volume group, the process includes an initial sync of the data from the source to the replica. Depending on volume size and amount of data written to volumes, this sync can take hours. After the initial synchronization process is complete, the replication process is continuous, with the typical Recovery Point Object (RPO) target rate being less than thirty minutes for replication across regions, however the RPO can vary.

# Policy-Based Backups

The Oracle Cloud Infrastructure Block Volume service provides you with the capability to perform volume backups and volume group backups automatically on a schedule and retain them based on the selected backup policy.

There are two kinds of backup policies:

* **User defined**: Custom backup policies that you create and configure schedules for.
* **Oracle defined**: Predefined backup policies that have a set backup frequency and retention period. You cannot modify these policies.

### **Bronze Policy**

The bronze policy includes monthly incremental backups, run on the first day of the month. These backups are retained for twelve months. This policy also includes an incremental backup, run yearly during the first part of January. This backup is retained for five years.

### **Silver Policy**

The silver policy includes weekly incremental backups that run on Sunday. These backups are retained for four weeks. This policy also includes monthly incremental backups, run on the first day of the month and are retained for twelve months. Also includes an incremental backup, run yearly during the first part of January. This backup is retained for five years.

### **Gold Policy**

The gold policy includes daily incremental backups, retained for seven days, along with weekly incremental backups, run on Sunday and retained for four weeks. Includes monthly incremental backups, run on the first day of the month, retained for twelve months. Also includes an incremental backup, run yearly during the first part of January. This backup is retained for five years.

**Object storage:**

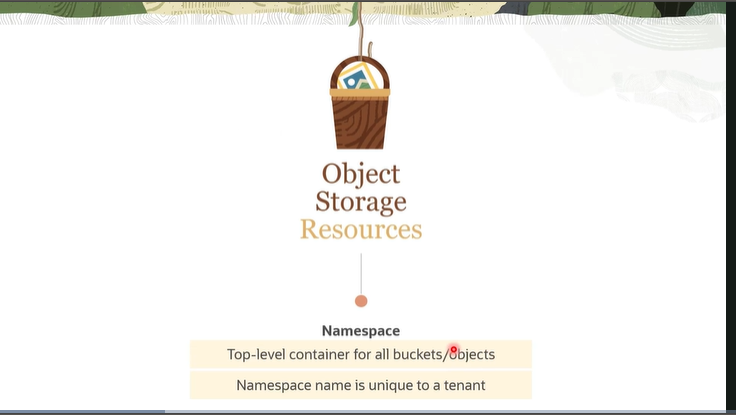
provides a summary of OCI storage services. Our focus in this section is going to be on object storage and archive storage. So as you can see, these services provide unlimited capacity with high durability, and you can store objects that are up to 10 TiB bytes and 1 TiB byte equals nearly 1.1 TB. For storing unstructured data, like images, videos, we use object storage, and for long-term archival needs, we use archive storage.

**FEATURES OF OBJECT STORAGE:**

Highly available and durable

Strong Security and Monitoring

Easy to use and cost effective



he first construct **is** namespace. Think of it like a top-level container for all buckets and objects. At account creation time, each OCI tenant is assigned one unique object storage namespace.

The data that you store in the object storage is stored as an object along with its metadata. And then we have the bucket, which is a logical container for storing objects. The name for a bucket has to be unique in a region within each tenancy.

For example, you can create a bucket named demo bucket in India West or the Mumbai region. What it means is you cannot create another bucket with the same name, demo bucket, in the Mumbai region. But you can create a bucket with the same name, demo bucket, in India South or the Hyderabad region. Please note that within an object storage namespace, buckets and objects exist in a flat structure or the flat hierarchy.

Understanding Storage Tiers

Oracle Cloud Infrastructure offers distinct storage class tiers to address the need for both performant, frequently accessed "hot" storage, less frequently accessed "cool" storage, and rarely accessed "cold" storage. Storage tiers help you maximize access performance where appropriate and minimize storage costs where possible.

Every object uploaded to Object Storage is assigned to a storage tier. The storage tier property of the object determines its storage costs and any associated retrieval fees. The storage tier property is assigned to an object in one of two ways:

* The object is automatically assigned the default storage tier of the bucket (Standard or Archive) that you are uploading the object to.
* If you are uploading an object to a Standard default storage tier bucket, you can explicitly assign any permitted storage tier (Standard, Infrequent Access, or Archive) to the object.
* The following table summarizes the features of the Standard, Infrequent Access, and Archive tiers.

| **Tier** | **Storage Cost** | **Retention Period** | **Retrieval Fee** | **y SLA** |
| --- | --- | --- | --- | --- |
| Standard | Highest | None | No |  |
| Infrequent Access | Cheaper | 31 days | Yes |  |
| Archive | Lowest | 90 days | No |  |

## **Standard Tier**

The **Standard** tier is the primary, default storage tier used for [Object Storage](https://docs.oracle.com/en-us/iaas/Content/Object/Concepts/objectstorageoverview.htm#Overview_of_Object_Storage) service data. The Standard storage tier is "hot" storage used for data that you need to access quickly, immediately, and frequently. Data accessibility and performance justifies a higher price to store data in the Standard tier.

You choose a default storage tier (Standard or Archive) when you create a bucket. When set at bucket creation, you cannot change the default storage tier for a bucket. When you upload objects to a bucket, the objects are automatically assigned the default storage tier of the bucket (Standard). You can, however, change the storage tier of an object to either Infrequent Access or Archive.

Standard storage tier buckets can contain a mix of objects with different storage tier assignments. An object remains in the Standard bucket, even if the object is archived, restored, or its tier assignment is changed.

When you choose a Standard default storage tier during bucket creation, you can also enable **Auto-Tiering**. Auto-Tiering helps you reduce storage costs by automatically moving objects between the Standard and Infrequent Access storage tiers based on data access patterns. See [Enabling Auto-Tiering](https://docs.oracle.com/en-us/iaas/Content/Object/Concepts/understandingstoragetiers.htm#auto_tiering) for details.

## **Infrequent Access**

The **Infrequent Access** tier is "cool" storage used for data that you access infrequently, but that must be available immediately when needed. Storage costs are lower than **Standard**.

If you are uploading an object to a Standard default storage tier bucket, you can explicitly assign the object to the lower-cost Infrequent Access storage tier.

The Infrequent Access tier has a minimum storage retention period and data retrieval fees:

* The minimum storage retention period for the Infrequent Access tier is 31 days. If you delete or overwrite objects in the Infrequent Access tier before the retention requirements are met, you are charged the prorated cost of storing the data for the full 31 days.
* When you need to access objects stored in this tier, you are charged a per GiB data retrieval fee.

## **Archive**

The **Archive** tier is the primary, default storage tier used for [Archive Storage](https://docs.oracle.com/en-us/iaas/Content/Archive/Concepts/archivestorageoverview.htm#Overview_of_Archive_Storage) service data. The Archive storage tier is "cold" storage used for data seldom or rarely access, but that must be retained and preserved for long periods of time.

You choose a default storage tier (Standard or Archive) when you create a bucket. When set at bucket creation, you cannot change the default storage tier for a bucket. When you upload objects to a bucket in an Archive tier, the objects are automatically assigned the default storage tier of the bucket (Archive).

Archive storage tier buckets can only contain objects with an Archive storage tier assignment. Archive buckets do **not** contain a mix of objects with different storage tier assignments. An object remains in the Archive bucket, even if the object is restored.

Objects in the Archive tier must be restored before they are available for access. The cost efficiency of the Archive tier offsets the lead time required to access the data. However, the Archive tier has a minimum storage retention period and some additional storage fees:

* The minimum storage retention period for the Archive tier is 90 days. If you delete or overwrite objects in the Archive tier before the retention requirements are met, you are charged the prorated cost of storing the data for the full 90 days.
* When you restore objects, you are returning those objects to the Standard tier for access. You are billed for the Standard class tier while the restored objects reside in that tier.

Mounting object storage :

# Mounting an Object Storage Bucket as File System on Oracle Linux

[Marcin Zablocki](https://blogs.oracle.com/authors/marcin-zablocki)

Solutions Architect

Recently, I found that I need to move a lot of automatically generated report files to Object Storage for easy delivery. I could do this in one of several ways: by writing a Python script using Oracle Cloud Infrastructure SDKs, using pre-authenticated requests, writing curl, and bash scripts. But I thought it would be nice to access Object Storage content directly using a file system without having to change any of my existing automation scripts.

Thanks to the [s3fs-fuse](https://github.com/s3fs-fuse/s3fs-fuse) project and Oracle Cloud Infrastructure's [S3 compatible API](https://docs.cloud.oracle.com/iaas/Content/Object/Tasks/s3compatibleapi.htm), this is possible and pretty easy to do.

For this tutorial, you need an Oracle Cloud Infrastructure account, and Oracle Linux 7 compute instance, SSH, and about 10 minutes. Let's start!

## Prerequisites:

Make sure that bucket you're trying to mount is in the compartment listed for S3 compatibility, by default it's a root compartment of the tenancy.

If you need to change that, settings are located under Administration->Tenancy Details->Edit Object Storage Settings

## Step 1: Install s3fs-fuse

You can install s3fs-fuse either from [source](https://github.com/s3fs-fuse/s3fs-fuse/blob/master/COMPILATION.md) or by using a prebuilt package from the Oracle Linux EPEL repository. In this post, I'm using the binary RPM.

yum install s3fs-fuse

## Step 2: Configure Credentials

In the Oracle Cloud Infrastructure Console, click the Profile icon in the top-right corner, and select **User Settings**.

Click **Customer Secret Keys**, and then click **Generate Secret Key**.

Give the key a meaningful name (for example, **s3fs-access**), and then click **Generate Secret Key**.

Copy and save the secret key because it won't be shown again.

The S3 credentials are created by using an access key and the secret key. The access key is displayed in the Customer Secret Keys area of the Console.



Enter your credentials in a ${HOME}/.passwd-s3fs file and set owner-only permissions:

echo ACCESS\_KEY\_ID:SECRET\_ACCESS\_KEY > ${HOME}/.passwd-s3fs

chmod 600 ${HOME}/.passwd-s3fs

## Step 3: Mount the File System

Run the mount by using the following command:

s3fs [bucket] [destination directory] -o endpoint=[region] -o passwd\_file=${HOME}/.passwd-s3fs -o url=https://[namespace].compat.objectstorage.[region].oraclecloud.com/ -onomultipart -o use\_path\_request\_style

As shown, S3-compatible endpoints are built in the following format:

mynamespace.compat.objectstorage.aa-region-1.oraclecloud.com

If you are using the opc user, you will see the following error:

fuse: failed to exec fusermount: Permission denied

Run the following command, and then try again:

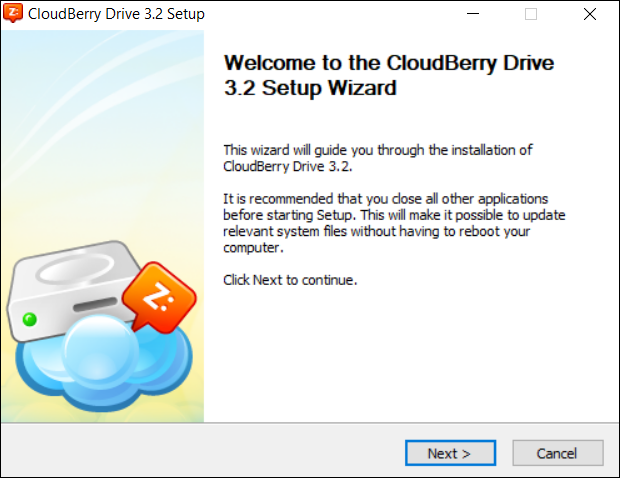
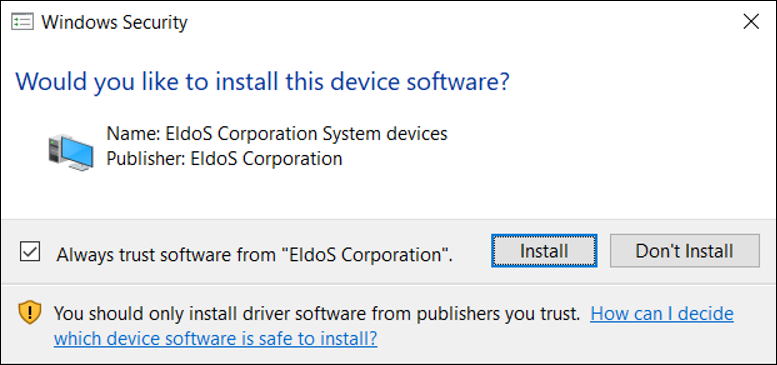
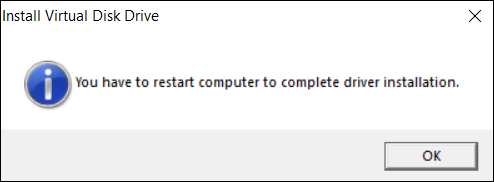
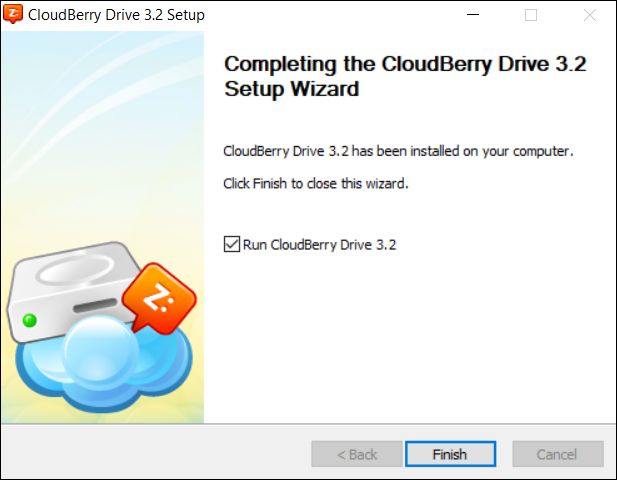
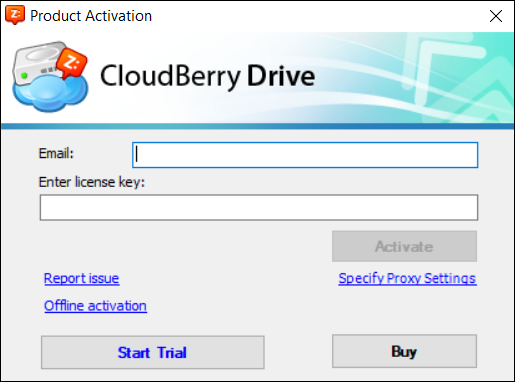
sudo chmod +x /usr/bin/fusermount

Now you can use the Object Storage bucket as a mostly POSIX-compliant file system.

**Windows:**

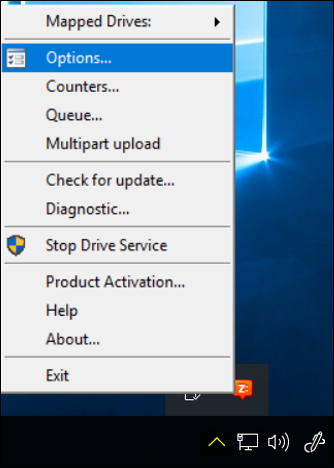
# Mounting on Windows

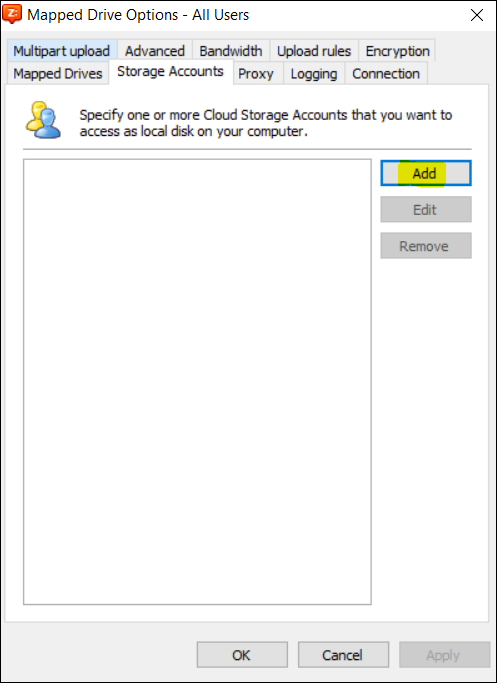
### 3-1. Install Cloudberry Drive on Windows

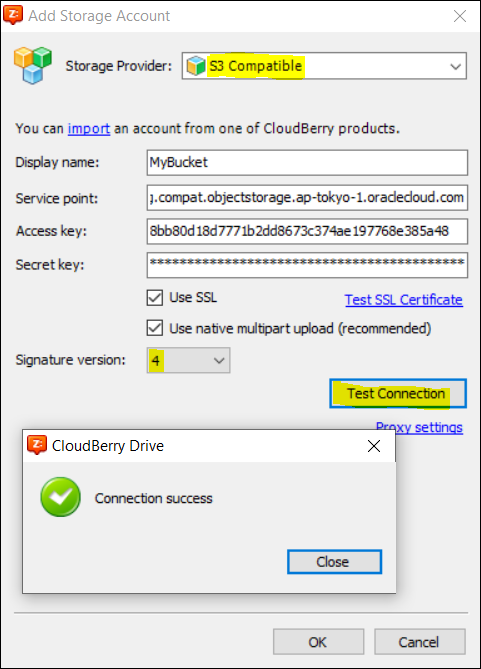
Download URL: <https://www.msp360.com/drive.aspx>  
Run install file to begin.  
[](https://camo.qiitausercontent.com/96f9e71e046c902e74c6ba7005b6d86a044eda3a/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f39383038316237362d656462362d616135612d326336392d6230626637316332373062662e706e67)  
Click install button to proceed.  
[](https://camo.qiitausercontent.com/ed302496dc2d607dd33c1023971d36dffbb05862/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f30663733373233322d653330632d323563332d386165622d6432663939396630653038352e706e67)  
Need to restart after installation.  
[](https://camo.qiitausercontent.com/a4e9202c9943c6200c5285216d6829998ba892ab/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f64396630613438652d313432652d353437322d643539372d3637653231353236363261372e706e67)  
Click "Finish" to run Cloudberry Drive.  
[](https://camo.qiitausercontent.com/623a0a12f847422c02d9a88176027227c3f1fe02/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f32626265333833622d663064622d303135392d396638632d6635316632313137633230362e706e67)  
Enter Email address, then click "Start Trial" to proceed.  
[](https://camo.qiitausercontent.com/49a3c43456c8a5589e7b31243449ba3b95c9b955/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f66633031663334642d616338622d346634392d373539372d3231333766653731356561642e706e67)

Restart PC after installation.

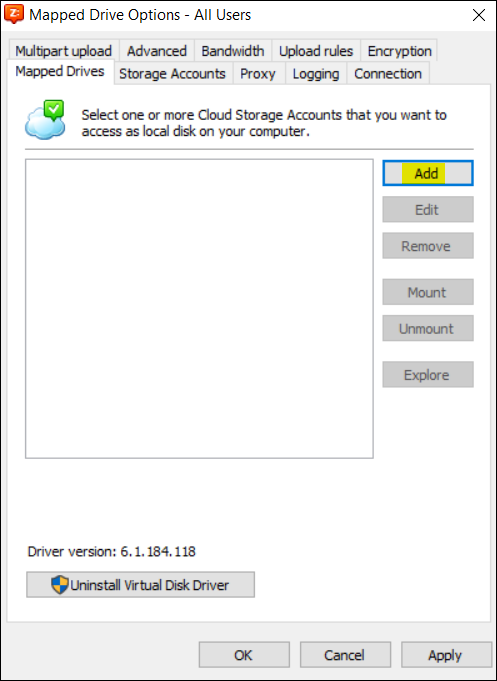
### 3-2. Add Storage Account

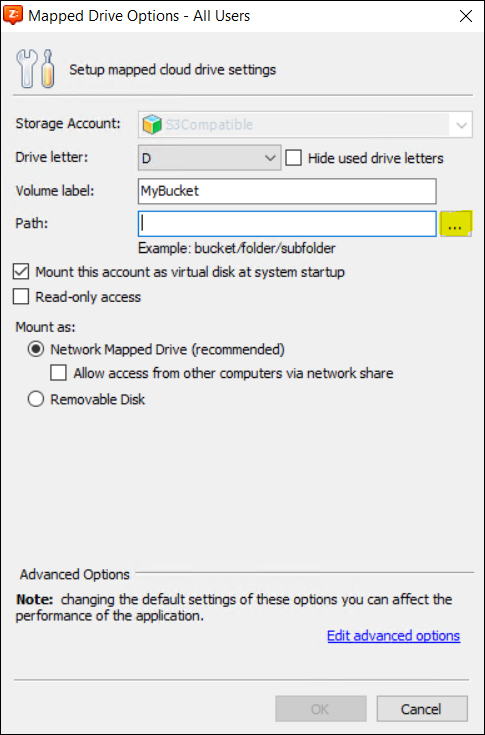
Task Bar -> Cloudberry Drive Icon -> Options  
[](https://camo.qiitausercontent.com/a369baf948db09e04972e21b6d30a21610387921/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f30613139643137612d623232632d623931632d306239362d6333666566313330306235342e706e67)

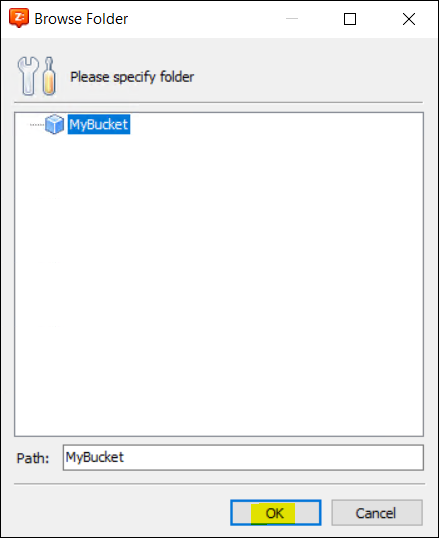
Click Add button to add storage account.  
[](https://camo.qiitausercontent.com/11f93e4dc82d4928a91421c003033a40920d332e/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f61393663313261392d323830342d643165372d333139362d6439326438663536633666382e706e67)

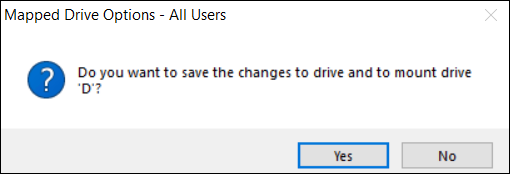
Enter required information as following, then click "Test Connection".  
**Storage Provider**: S3 Compatible  
**Display Name**: You name it.  
**Service Point**: <namespace\_name>.compat.objectstorage.<region>.oraclecloud.com  
**Access Key & Secret Key**: Generated by [STEP 1-1](https://qiita.com/liu-wei/items/17d9e22504b07f199a27#1-1-generate-credentials)  
**Signature version**: 4  
[](https://camo.qiitausercontent.com/6aa997c45e8ba84b6e2fb7fc5d7bdae31b949a99/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f30346263656333612d373436632d373566372d343937332d6436613364363039656534662e706e67)

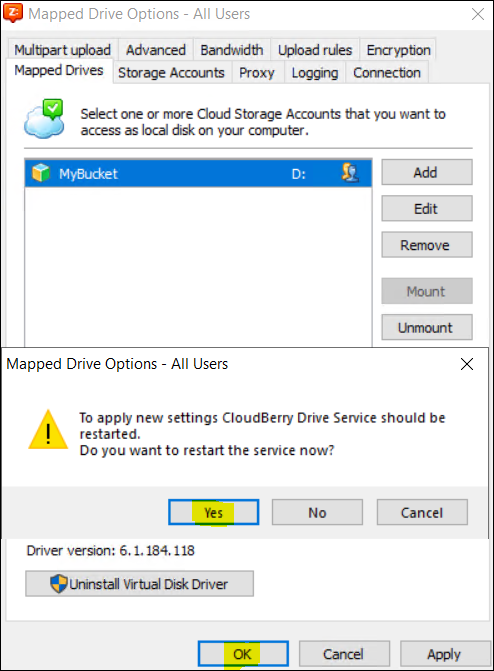
### 3-3. Add Mapped Drive

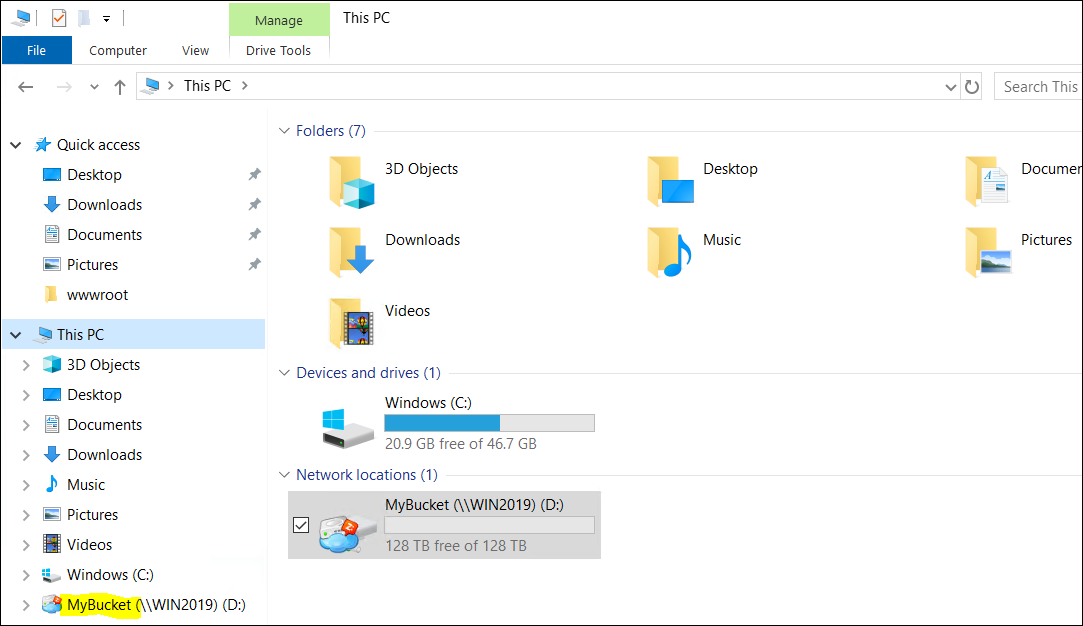
Click Add button to add mapped drive.  
[](https://camo.qiitausercontent.com/392dcbb06beb52ddc32320f4c538240d5ce8bbed/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f61313739616563622d656536312d663239312d363266642d3333303937363434653435302e706e67)

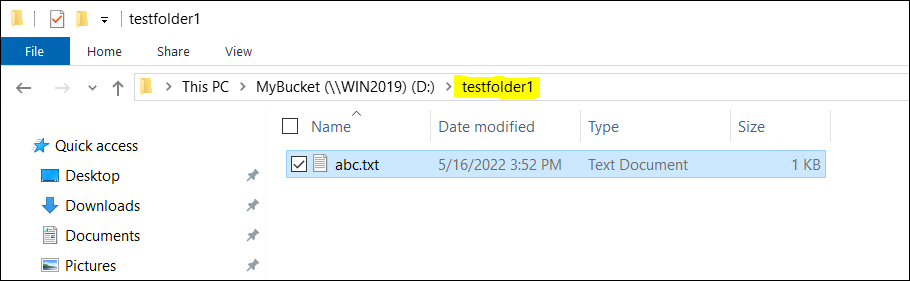
Click 3-dot button to select path.  
[](https://camo.qiitausercontent.com/5cc1402edb93041cb2d4873cf41abca8c18d5e3b/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f35396566313364392d353533612d356565392d663865302d3730373138633539373634362e706e67)

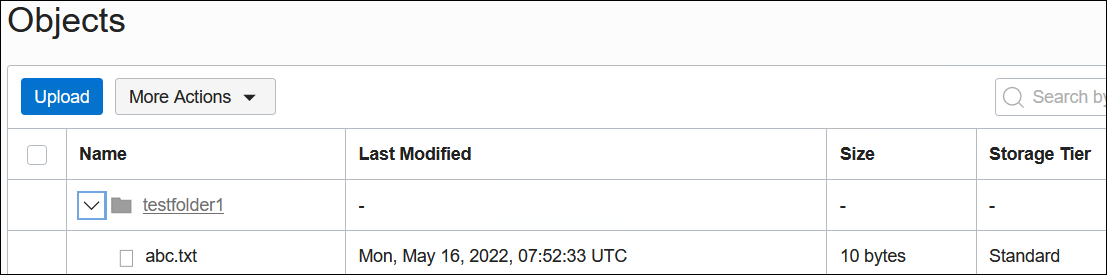
Select bucket from the list, then click OK to return.  
[](https://camo.qiitausercontent.com/88a9dee2f441b4ab398c870dcbdd53a5a5f95f9d/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f37336365326666352d656665632d646333382d393433652d3439323463373734303263612e706e67)

Click Yes to save the changes.  
[](https://camo.qiitausercontent.com/ed5e01133b0c2e2ae05eaa12e99ae2eedce7c4f0/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f33636462613166392d326265362d316666392d626232662d3537376662303232353366332e706e67)

Click OK to complete.  
[](https://camo.qiitausercontent.com/7ad4e1a3de72083b4107f1f046c11ae9b45200f1/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f63313738666130392d303932352d663230372d376265312d3235306662613433626439342e706e67)

Check the new drive from file explorer.  
[](https://camo.qiitausercontent.com/e810cd7c58196ddba83d3ac5bbabb9e4c6189662/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f65326462326164612d396239652d623138622d343166642d3163316230323662303037312e706e67)

**Verification**  
Create folder and file on new drive.  
[](https://camo.qiitausercontent.com/0ffb8ac3d4c0ab671c5578fb43ae8442606c4c2d/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f33636234356231632d623234342d393439312d633065642d6434386635316266323965332e706e67)

Above folder and file will be synced to the bucket immediately. You can verify the result from OCI console.  
[](https://camo.qiitausercontent.com/6d1de5e390b260f354f18536c0f1f8b72193ad67/68747470733a2f2f71696974612d696d6167652d73746f72652e73332e61702d6e6f727468656173742d312e616d617a6f6e6177732e636f6d2f302f313132313632322f64356466306661372d316164612d316539372d393338342d6666313165346461353334322e706e67)

End