



Advanced Computer Networks

Assignment-3

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20I-1955

Section: 1

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IBM Cloud is a cloud computing service for businesses that is provided by IBM. It includes every layer of the cloud that includes Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS) offered through public, private and hybrid cloud. With cloud IBM also provide 170 products and services that will run on the cloud platform which include storage, containers, AI, IOT, Blockchain etc. In this assignment we have to setup our account on IBM cloud and then from the lite services available we have to create the object storage with bucket and setup API/SDK to PUT or GET our data from that cloud storage.

1 Account Setup

For account setup I have to go to the IBM Cloud website "<https://cloud.ibm.com/registration>" and create new account using my university id so that I will able to access the Lite account services without adding my credit/debit card. After successfully creating the account, the website will redirect me to the dashboard from where I will get access to the services available.

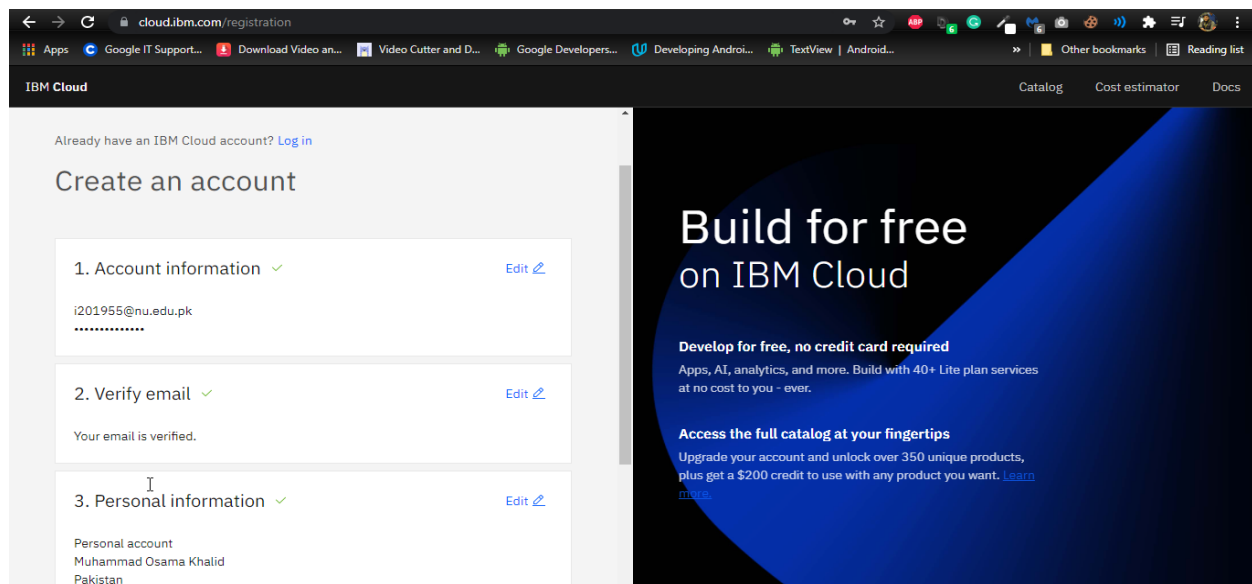


Figure 1: Account Creation

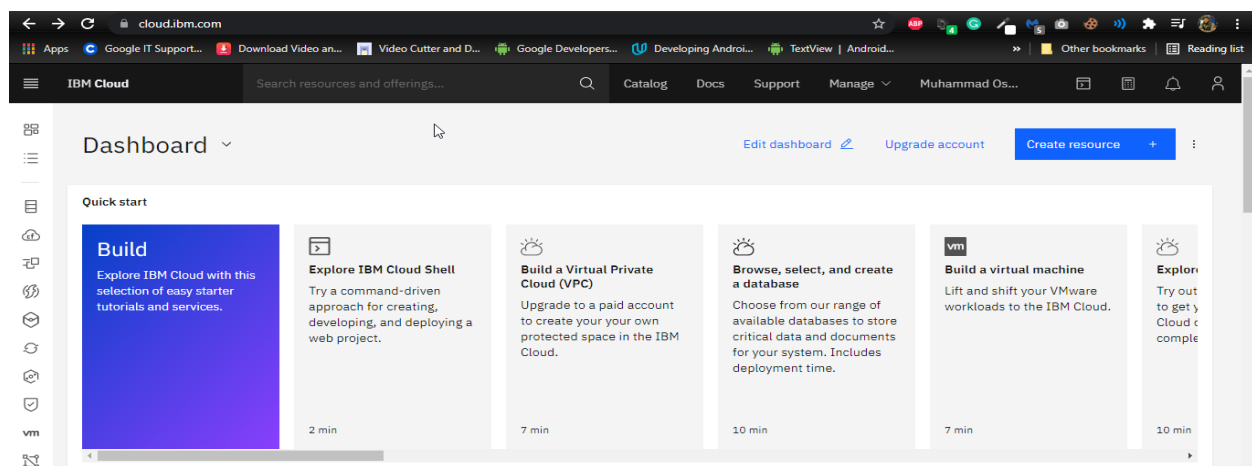


Figure 2: Dashboard

2 Lite account services available

To get to the list of lite services from dashboard I click on catalog button after the I am redirected to the new page that contains IBM Clod products. On that page from the left navigation bar, I click on services and go the Pricing plan section and click on Lite so that I will only get the list of lite services.

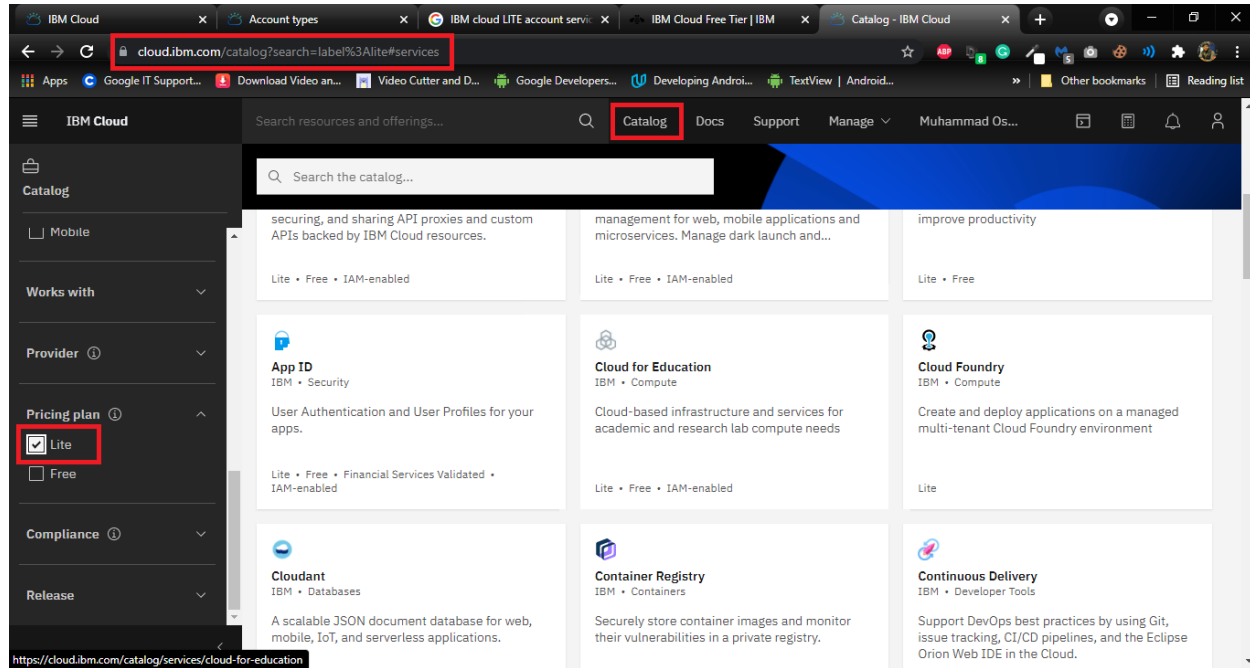


Figure 3: Lite Services

From the list of different services available the list of interesting services are as follows:

1. **Cloud for Education:** As the name describes this service provides cloud-based infrastructure and services for educational institutes and research labs.
2. **Internet of Things Platform:** This service lets us communicate and consume data from the connected IOT devices and gateways with the help of built-in dashboards and monitor then in the real time.
3. **Object Storage:** This service as name describes provide the cost-effective, flexible and scalable cloud storage.
4. **Quantum Services:** This service helps the users to access quantum computers and their underlying APIs that are running on IBM cloud.
5. **Watson Studio:** This service helps businesses to embed AI and machine learning into their business and helps them create custom models using their own data.
6. **NeuVector Container Security Platform:** This service provides the security to container through cloud-native Kubernetes security platform with the end-to-end vulnerability management and complete run time security including the company container's firewall to block zero days and other attacks.

3 Object Storage and Buckets

To create the object storage from the list of lite services I click on object storage that redirects me to Cloud Object Storage page from where I select the price plan, enter the service name and select the resource group and after that click on create to create the object storage. After that I go back to the dashboard and then click on resource list to check the whether the object storage is created or not and found that the cloud storage is created and active.

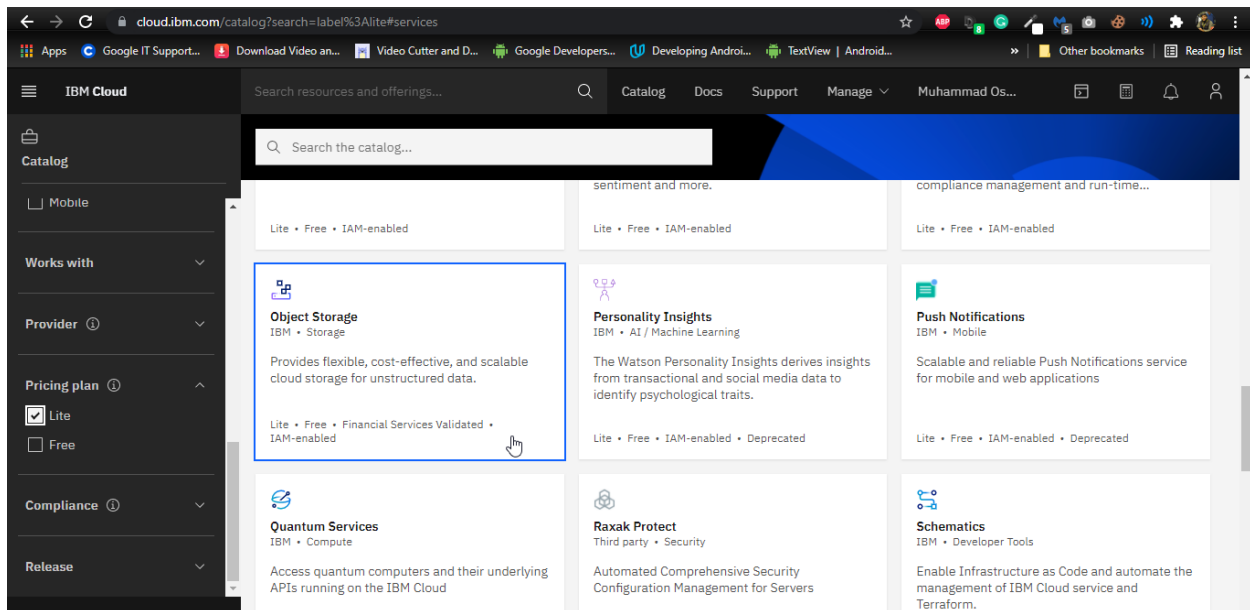


Figure 4: Selecting the object storage

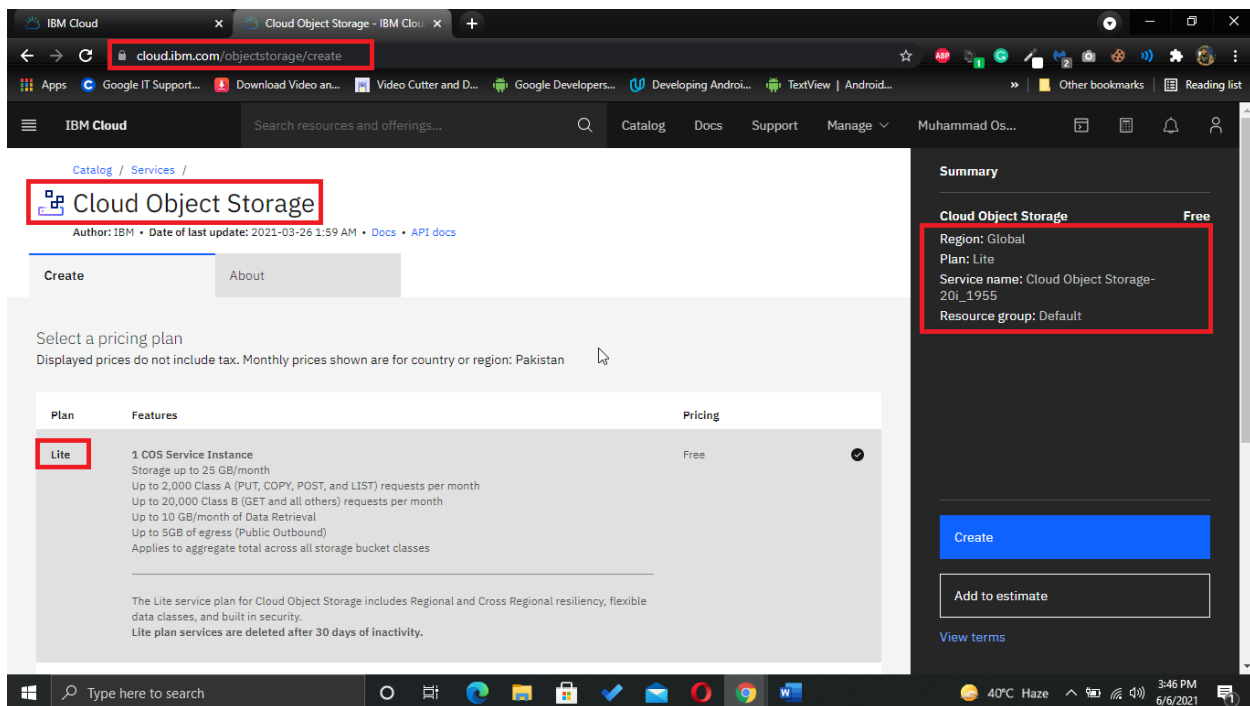


Figure 5: Creating the object storage

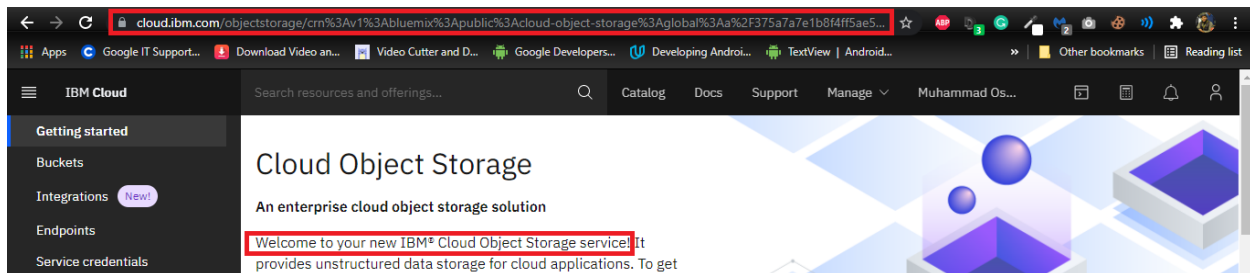


Figure 6: Object Storage Created Successfully

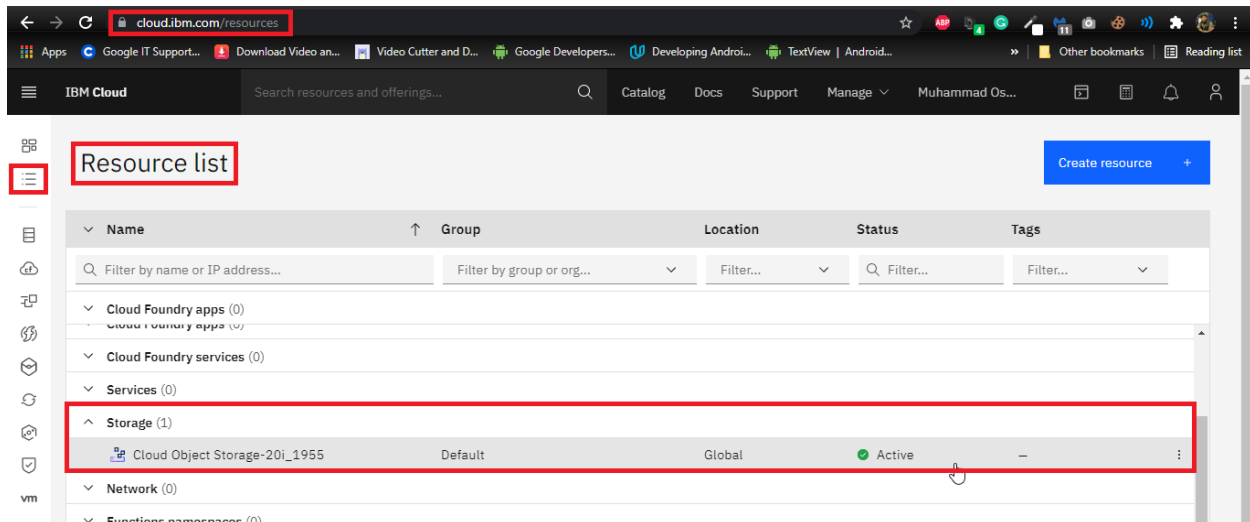


Figure 7: Object Storage Created Successfully

After the creation of object storage, we have to create the bucket so that we can add or upload our files or data (In IBM object storage, the files and data that stored in the bucket is called object.) into the storage. For that from the left navigation pane I click on bucket which opens the bucket main page from where we can see already created buckets or we can click on create bucket page to create the new bucket for our storage. On that page I click on create bucket button and then click on customize bucket arrow button which redirects me to the bucket creation page. On that page first I give the unique name to my bucket by following the bucket naming rules by IBM, then from Resiliency tab I select Regional, then I select the location, after that I select the storage plan and then I click on create button to create the bucket for my object storage.

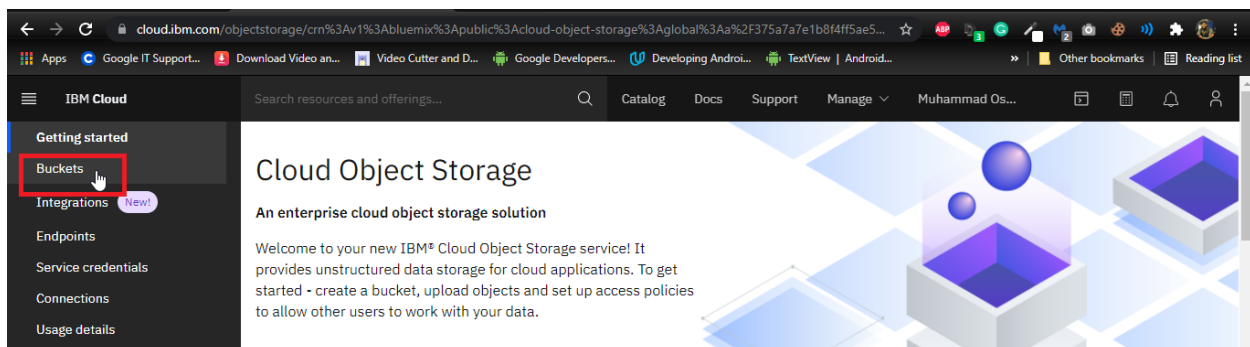


Figure 8: Bucket Creation

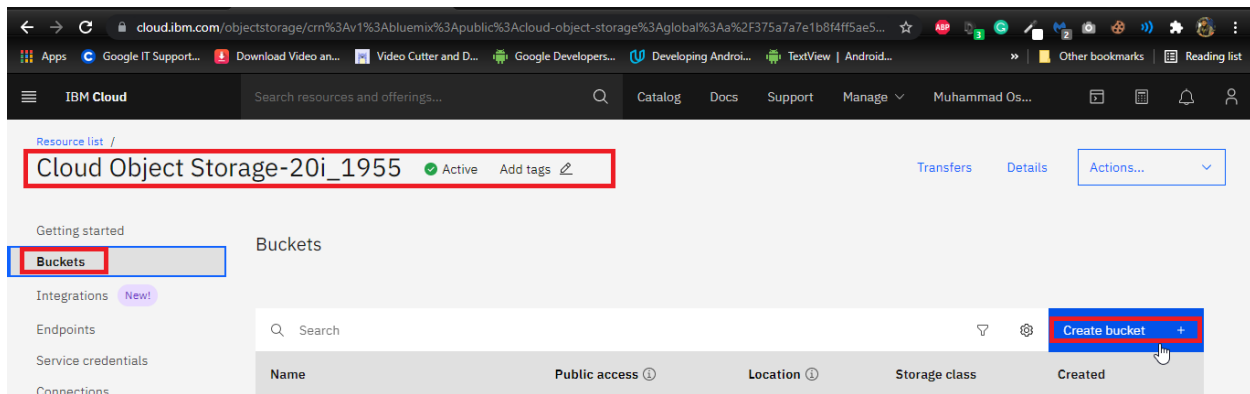


Figure 9: Bucket Creation

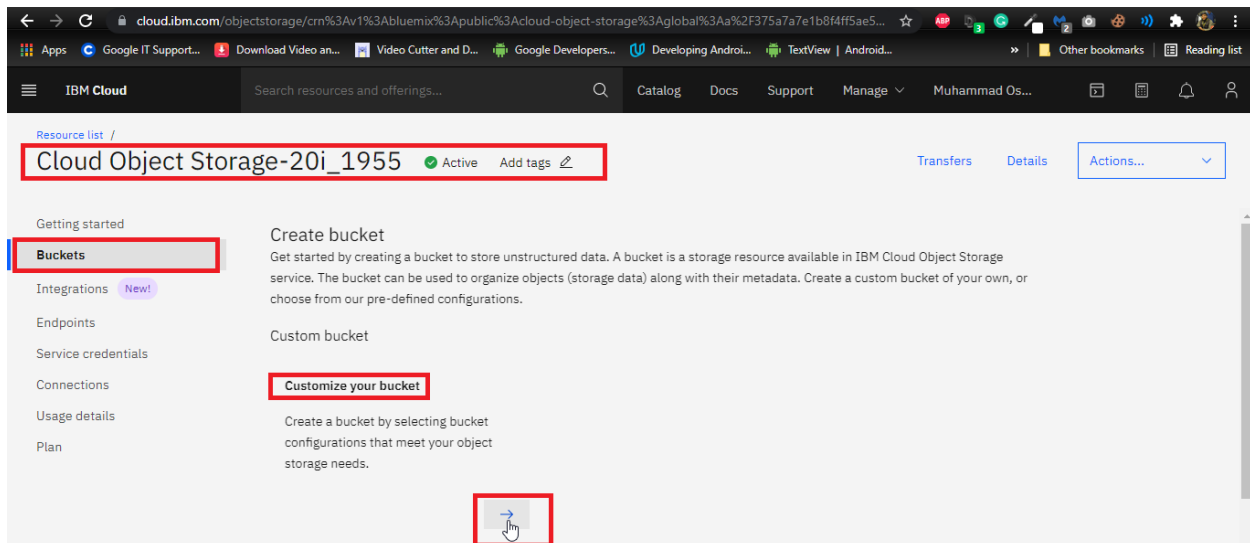


Figure 10: Bucket Creation

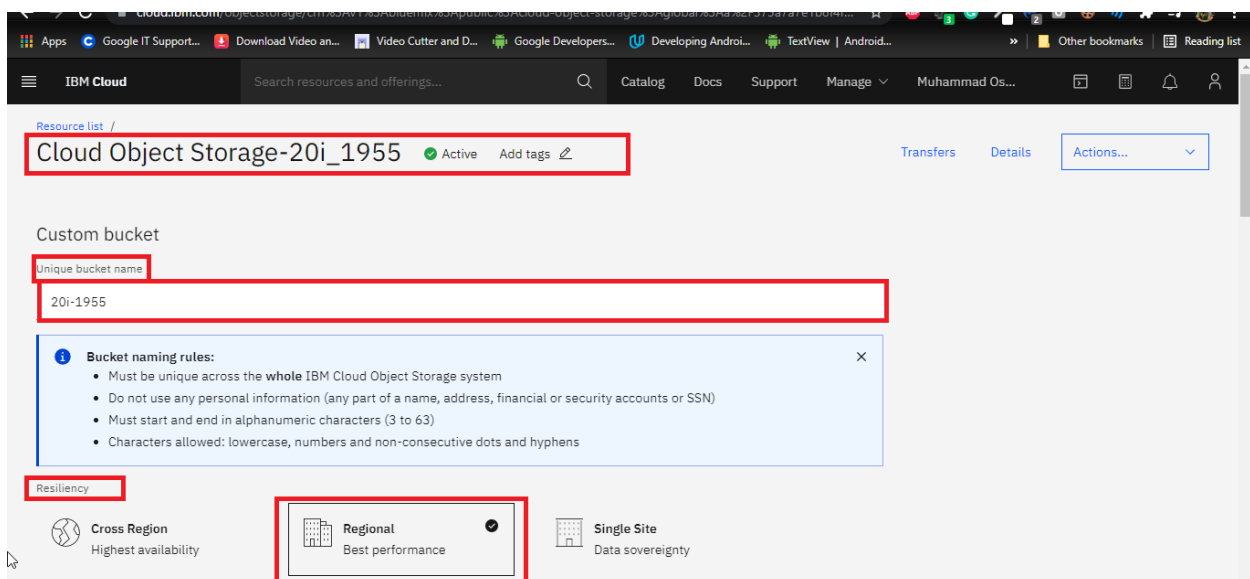


Figure 11: Bucket Creation

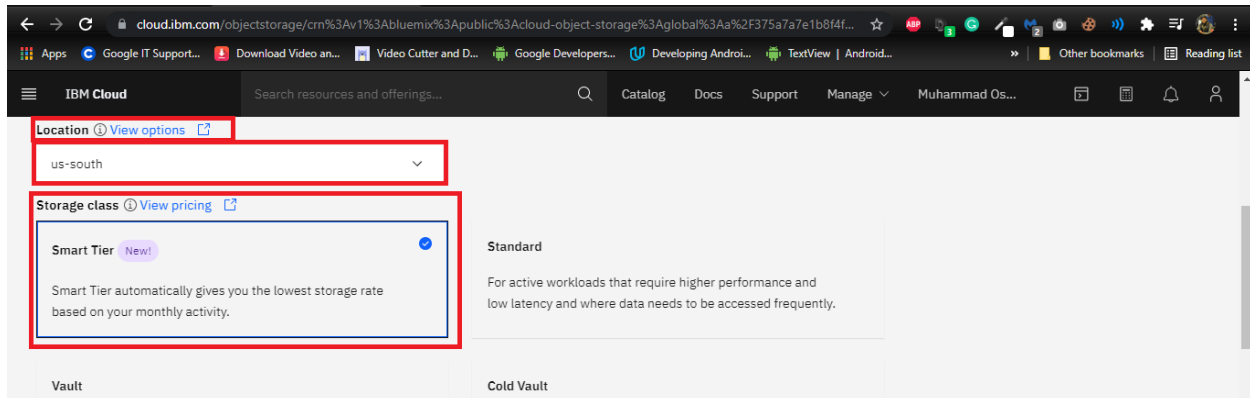


Figure 12: Bucket Creation

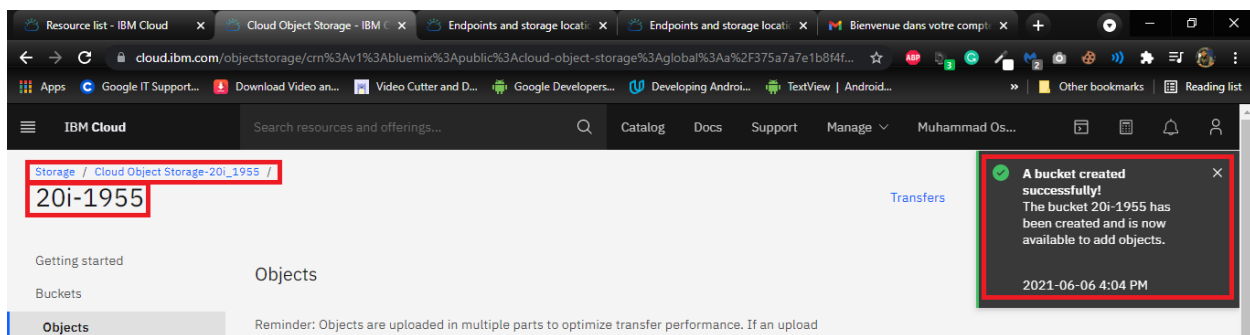


Figure 13: Bucket Created Successfully

4 Object storage in the bucket

In this task we have to upload file to the bucket to check whether our bucket is working or not. To do that under the bucket on the left navigation pane I click on object and then click on Upload button. After that from popup I select standard transfer and then I scroll down and then click on “click to upload” link and after that I select the file from my machine to upload to that storage and then click on upload button to upload that file to the bucket. After the successful upload of the file, we can click on the file to get the detail of the file or to download the file.

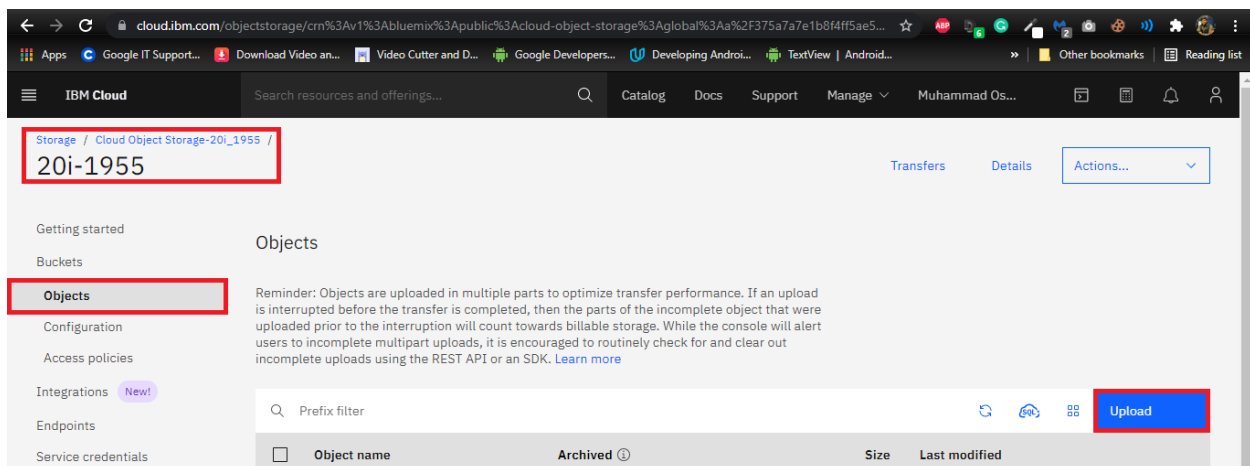


Figure 14: Uploading the file

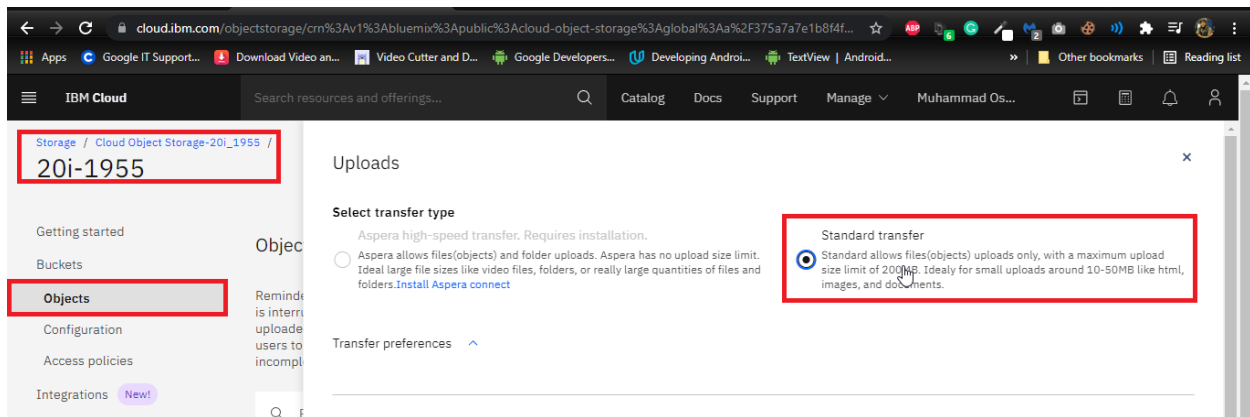


Figure 15: Uploading the File

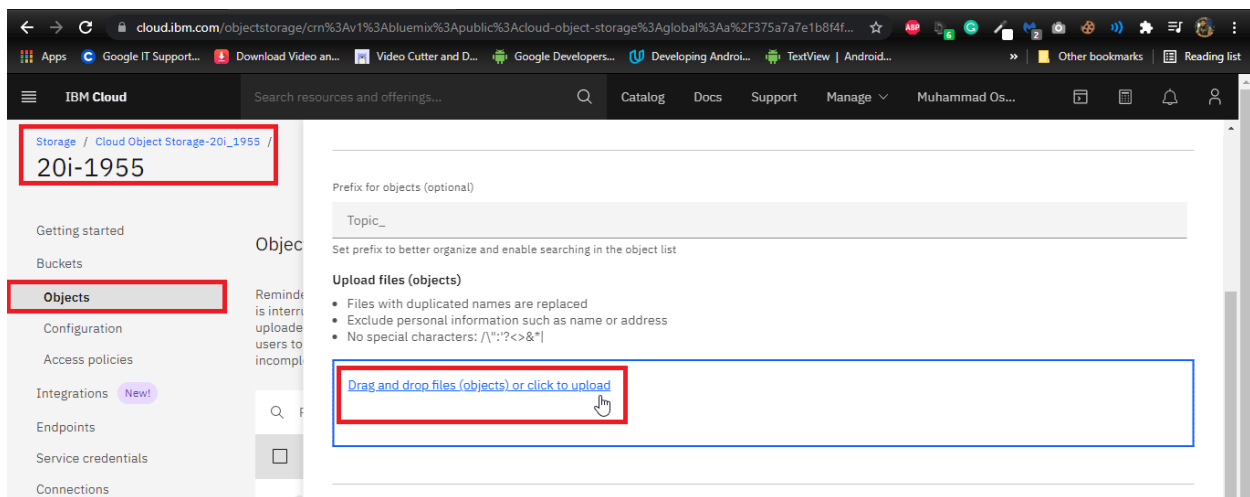


Figure 16: Uploading the File

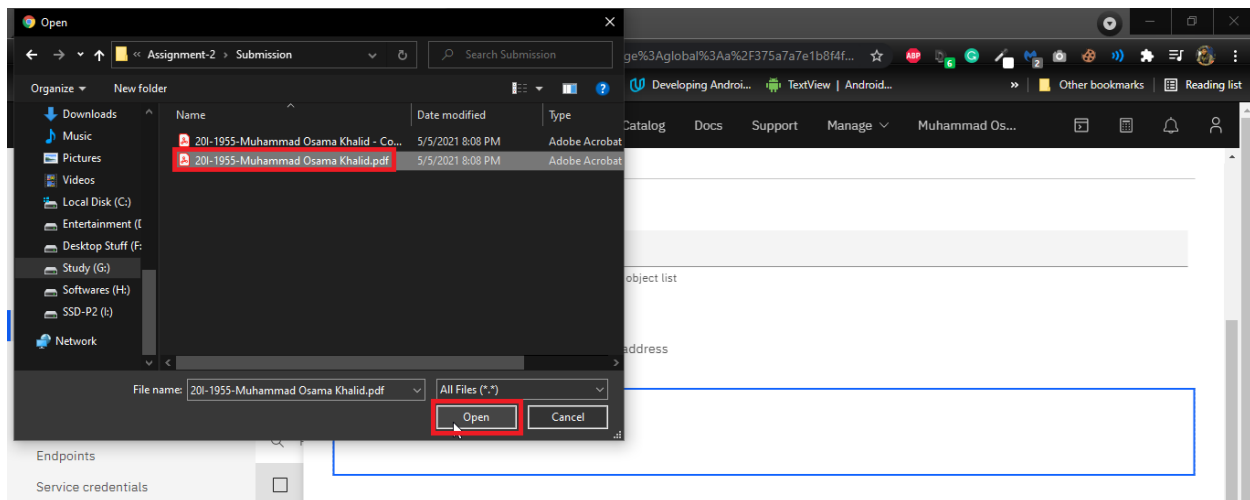


Figure 17: Uploading the File

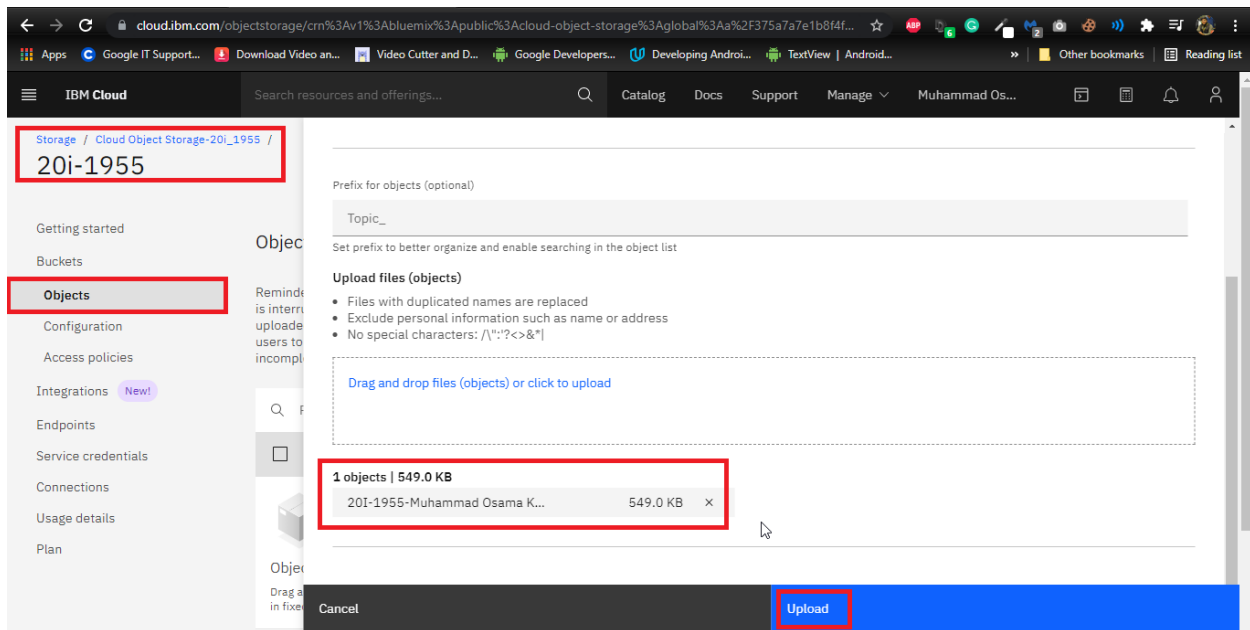


Figure 18: Uploading the File

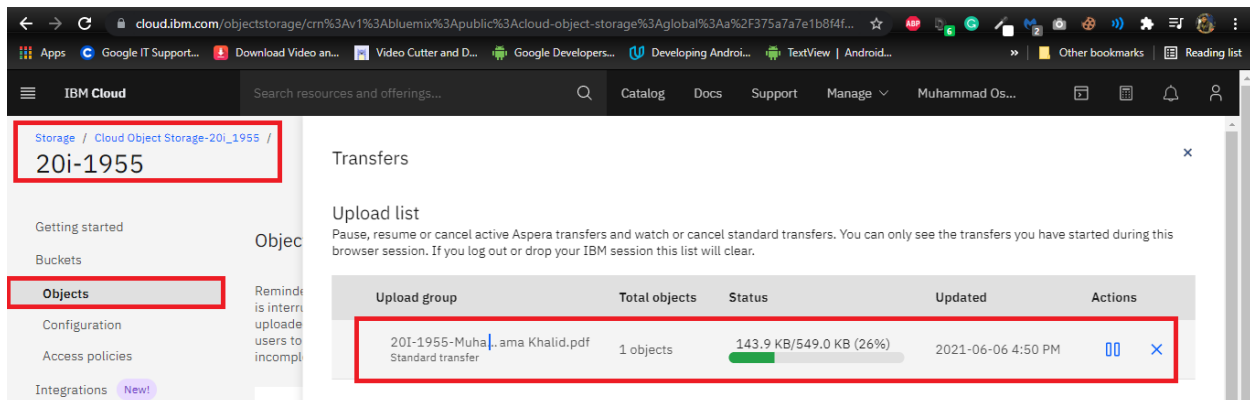


Figure 19: Uploading the File

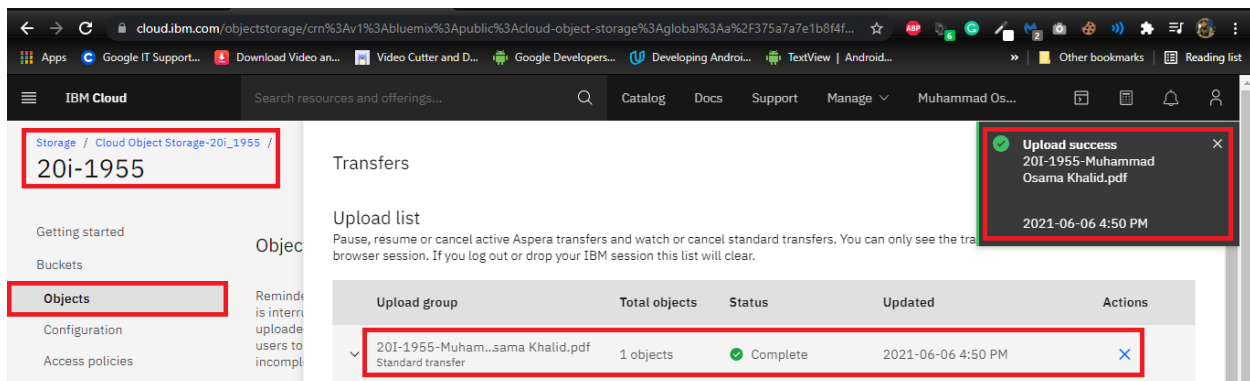


Figure 20: File uploaded successfully

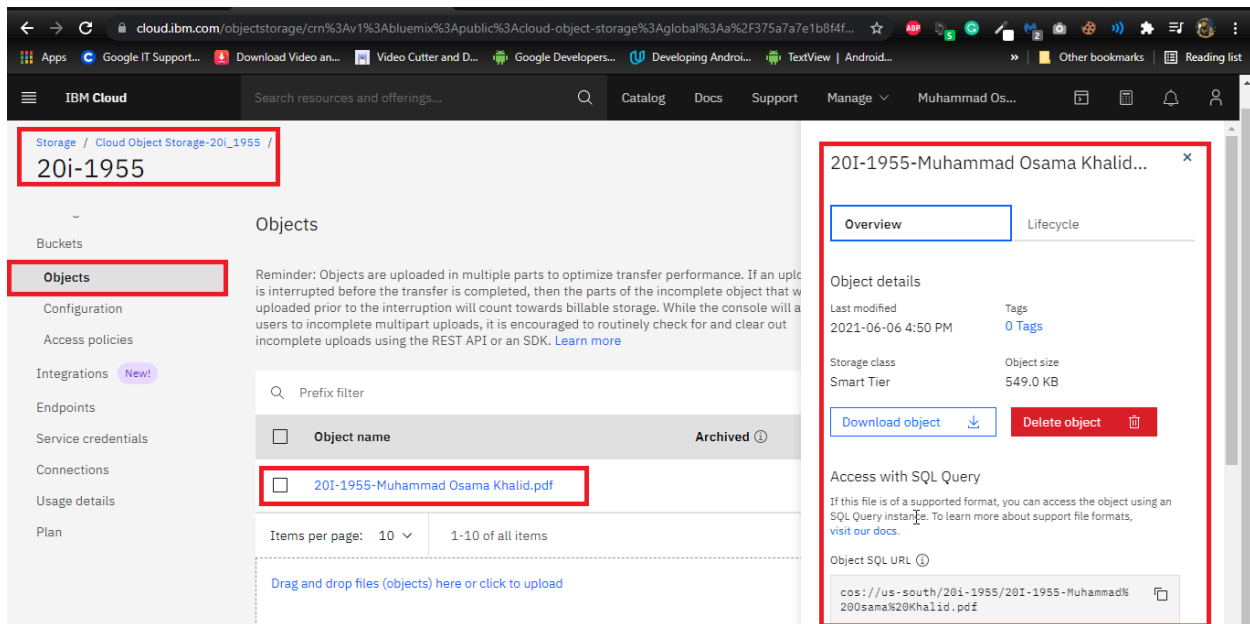


Figure 21: File Details

5 API/SDK Setup

In this task I will use IBM cloud cli with IBM cloud object storage plugin to create or delete bucket and also create, download and upload objects to the bucket. For that I first download the IBM cloud cli for windows from the IBM website “<https://cloud.ibm.com/docs/cli?topic=cli-install-ibmcloud-cli>” and then login to IBM cloud from the cli using the command “**ibmcloud login -sso**”.

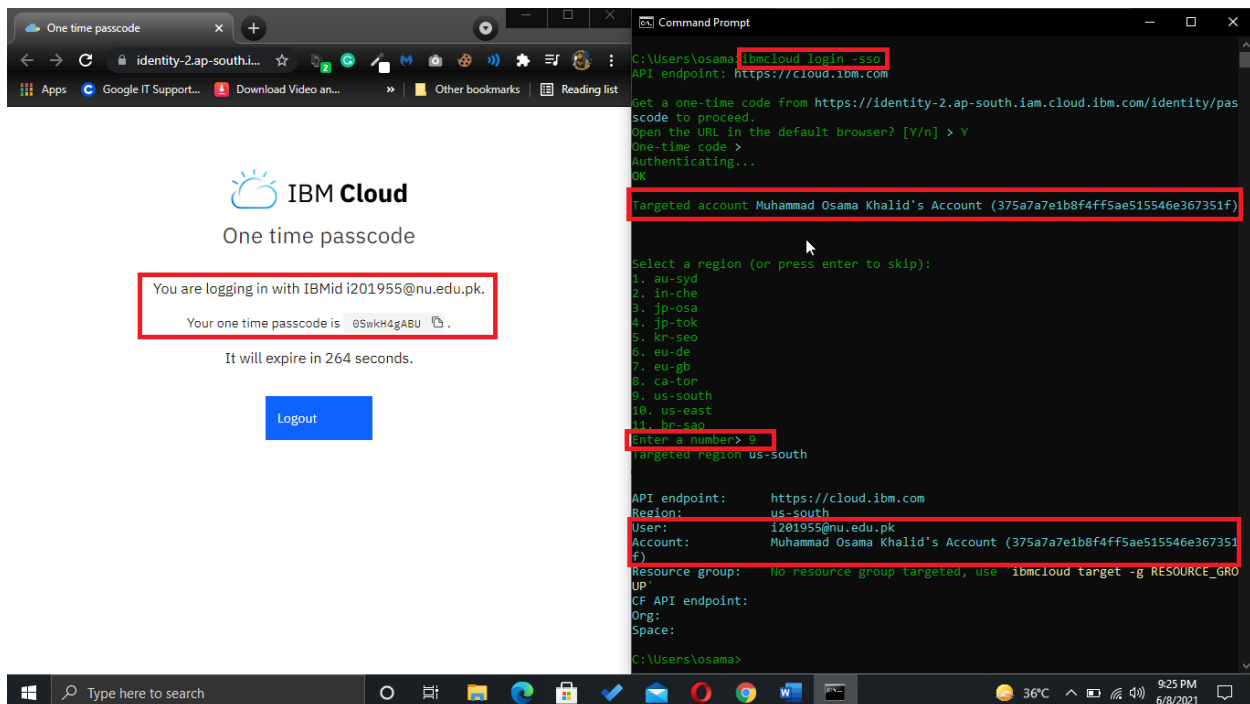


Figure 22: Login to the IBM cloud from the CLI

[illegible]

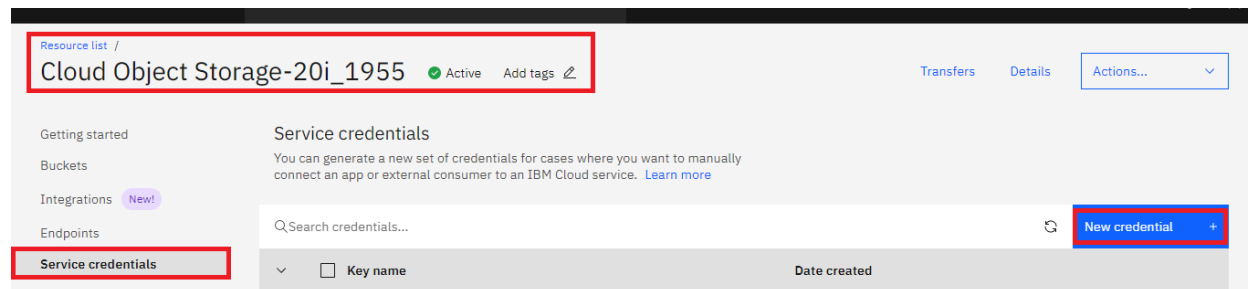
After that I install the IBM cloud object storage plugin so that I will be able to create or delete bucket and also create, download and upload objects to the bucket in the object storage. For that I use command “ibmcloud plugin install cloud-object-storage”.

```

C:\Users\osama>ibmcloud plugin install cloud-object-storage
Looking up 'cloud-object-storage' from repository 'IBM Cloud'
Plugin 'cloud-object-storage 1.2.3' found in repository 'IBM Cloud'
Attempting to download the binary file...
11.75 MiB / 11.75 MiB [=====] 100.00% 7s
2322816 bytes downloaded
Installing binary...
OK
Plugin 'cloud-object-storage 1.2.3' was successfully installed into C:\Users\osama\bluemix\plugins\cloud-object-storage. Use 'ibmcloud plugin show cloud-object-storage' to show its details.

```

Now for further authentication I need to setup the HMAC (Hash based Message Authentication Code) credentials for that I first need to go to bucket page and then from the left navigation pane I click on service credentials. Then I click on new credentials to create the HMAC credentials. After that from popup I enter the name and role of the new credential user, after that from Service ID I click on create Auto generate so that it will automatically generate the API key and the Secret Key of that user. Then I turn on Include “HMAC Credentials” option so that it will include the credentials in the result. After that I click on ADD button to create the HMAC Credentials of the user. As the HMAC Credentials for user created I click on the dropdown arrow button to see the result.



10

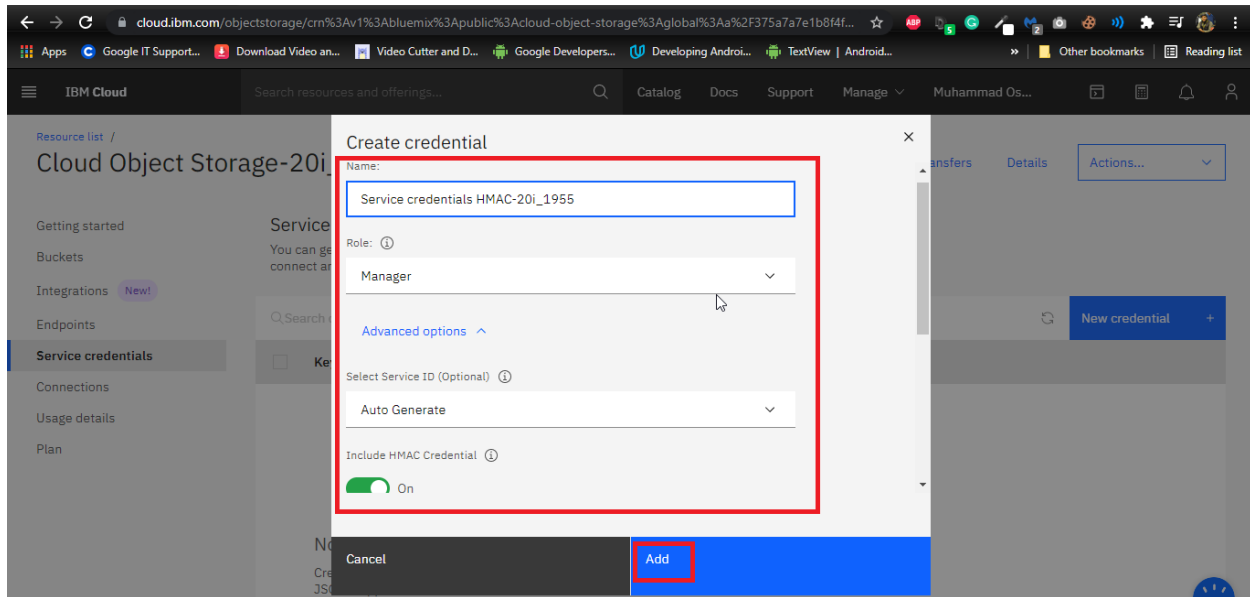


Figure 26: Adding the details of the user with the role

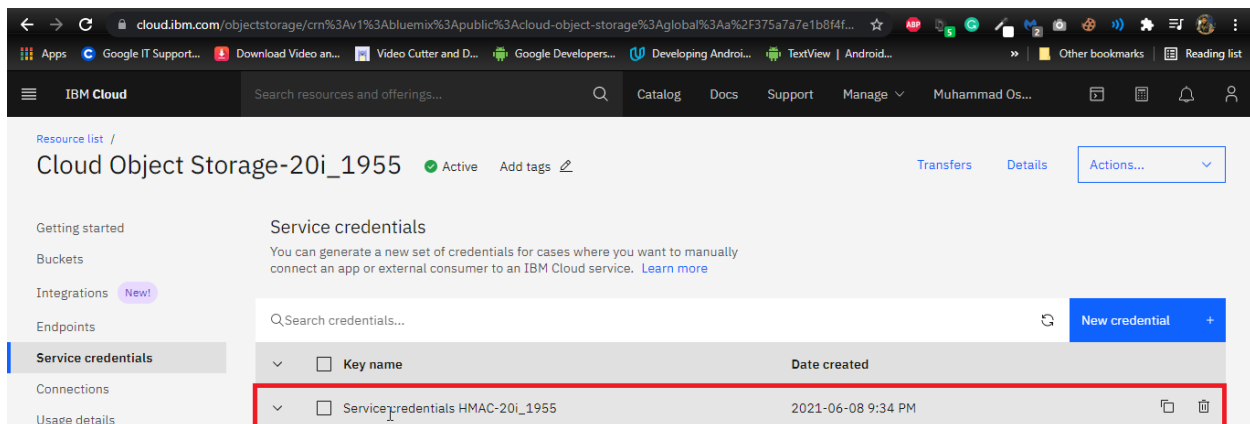


Figure 27: HMAC Credentials created Successfully

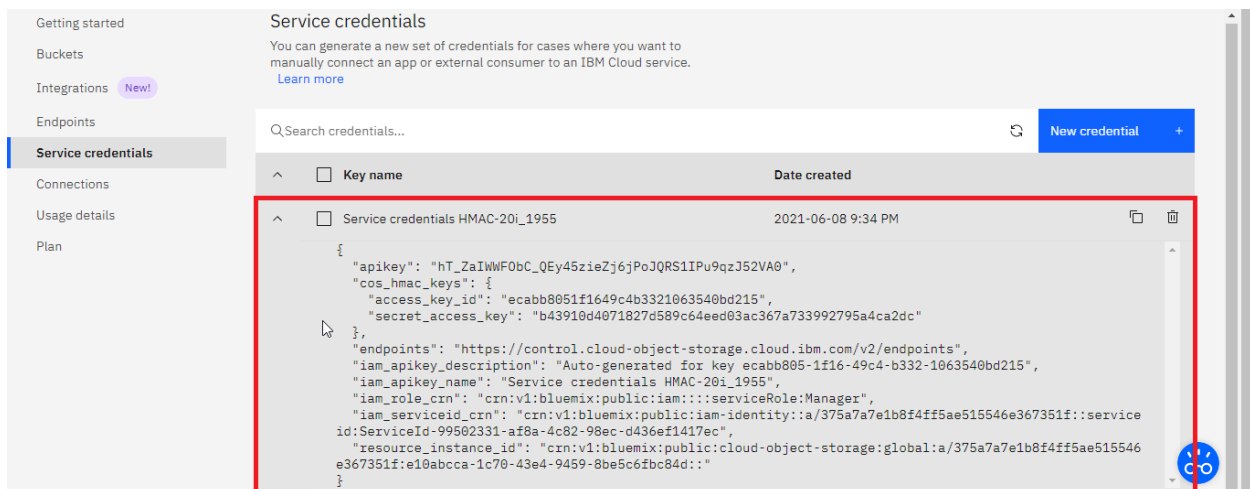


Figure 28: Result of the HMAC Credentials

After that to get authenticated, I go back to the CLI and used command “**ibmcloud cos config hmac**” to provide the access key and the secret key generated by HMAC Credentials.

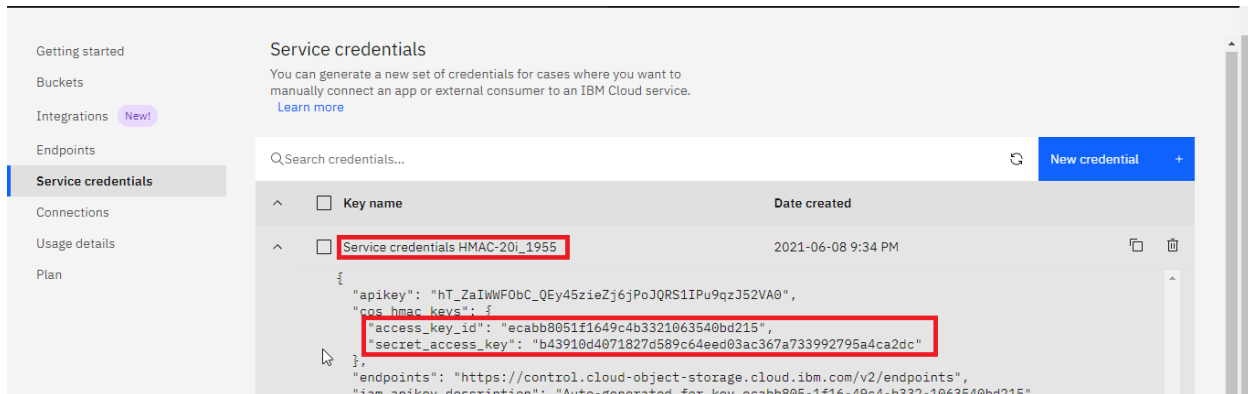


Figure 29: HMAC Credentials result

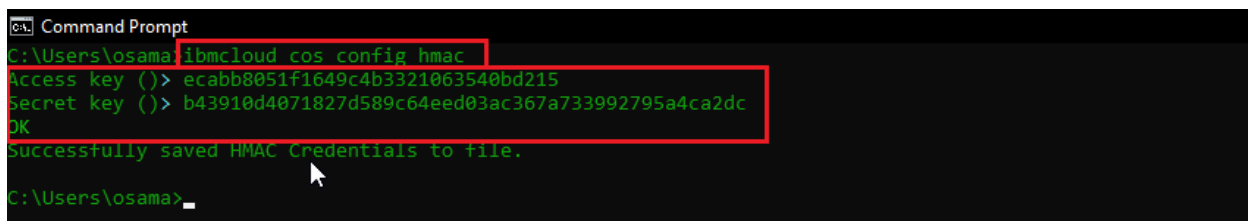


Figure 30: Config HMAC Credentials

After that I use “**ibmcloud cos config crn**” command to store the service instance id.

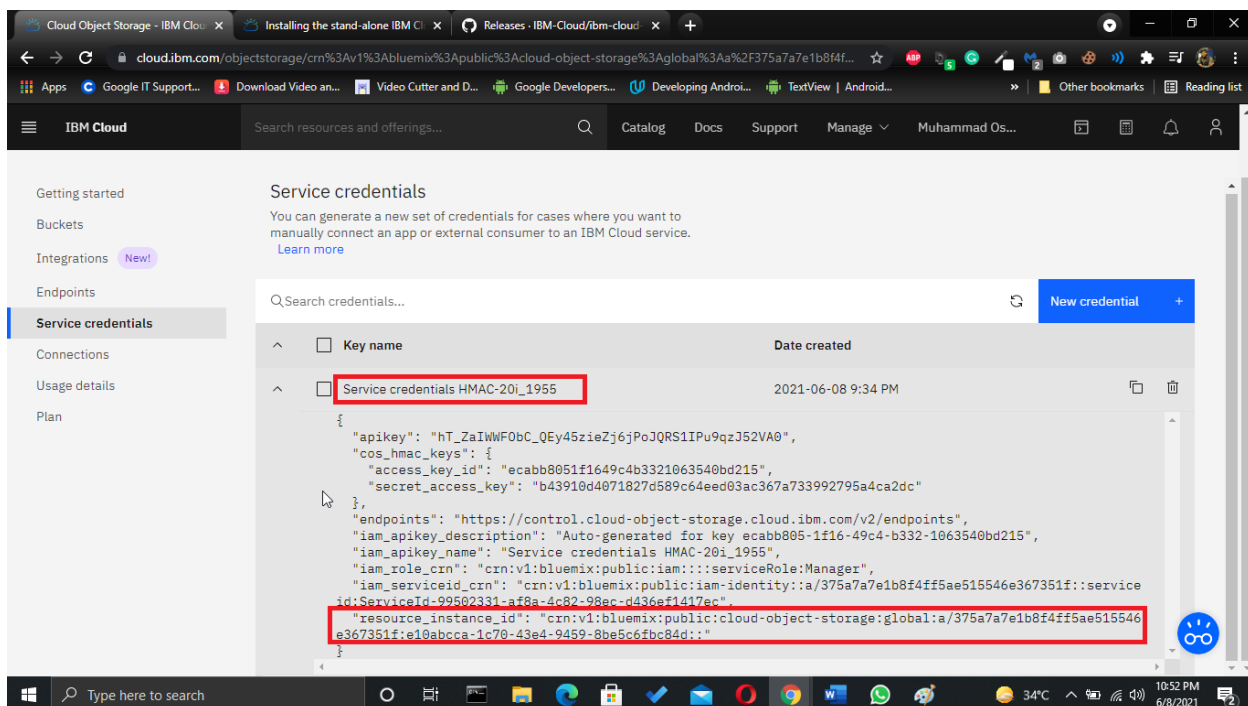


Figure 31: HMAC Result

```
Command Prompt
C:\Users\osama>ibmcloud cos config crn
Resource Instance ID CRN: (>) crn:v1:bluemix:public:cloud-object-storage:global:a/375a7a7e1b8f4ff5ae515546e367351f:e10abcca-1c70-43e4-9459-8be5c6fbc84d:
Saving new Service Instance ID...
OK
Successfully stored your service instance ID.
C:\Users\osama>
```

Figure 32: Storing the service instance id

After that to verify the configuration, I use that command “**ibmcloud cos config list**” and find that my configuration is successful.

```
Command Prompt
C:\Users\osama>ibmcloud cos config list
Key Value
Last Updated Tuesday, June 08 2021 at 21:40:25
Default Region us-south
Download Location C:\Users\osama\Downloads
CRN crn:v1:bluemix:public:cloud-object-storage:global:a/375a7a7e1b8f4ff5ae515546e367351f:e10abcca-1c70-43e4-9459-8be5c6fbc84d:
AccessKeyID ecabb8051f1649c4b3321063540bd215
SecretAccessKey *****
Authentication Method IAM
URL Style VHost
Service Endpoint
C:\Users\osama>
```

Figure 33: Verify the Configuration

After that to get the list of buckets from my object storage I use the command “**ibmcloud cos list-buckets**” which in result display my bucket in the object storage.

```
Command Prompt
C:\Users\osama>ibmcloud cos list-buckets
OK
1 bucket found in your account:

Name      Date Created
20i-1955  Jun 07, 2021 at 18:02:51

C:\Users\osama>
```

Figure 34: Bucket Details

After that to get the list of objects in the bucket I use the command “**ibmcloud cos list-objects --bucket 20i-1955**” which in result displays the objects that are currently present in my bucket.

```
Command Prompt
C:\Users\osama>ibmcloud cos list-objects --bucket 20i-1955
OK
Found 2 objects in bucket '20i-1955':

Name                               Last Modified      Object Size
20I-1955-Muhammad Osama Khalid.pdf Jun 07, 2021 at 18:09:47 548.99 KiB
20I-1955-MuhammadOsamaKhalid.pdf  Jun 08, 2021 at 16:51:49 548.99 KiB

C:\Users\osama>
```

Figure 35: Object List in the bucket

After that to download the object from the bucket I use the get object command with the file name as a key, the path where I want to store the file and the file name with extension. On running the command my file get downloaded and save to the specified path.

```
Command Prompt
C:\Users\osama>ibmcloud cos get-object --bucket 20i-1955 --key 20i-1955-MuhammadOsamaKhalid.pdf C:\Users\osama\Desktop\osama.pdf
OK
Successfully downloaded '20i-1955-MuhammadOsamaKhalid.pdf' from bucket '20i-1955'
548.99 KiB downloaded.
C:\Users\osama>
```

Figure 36: Get file from the Object storage

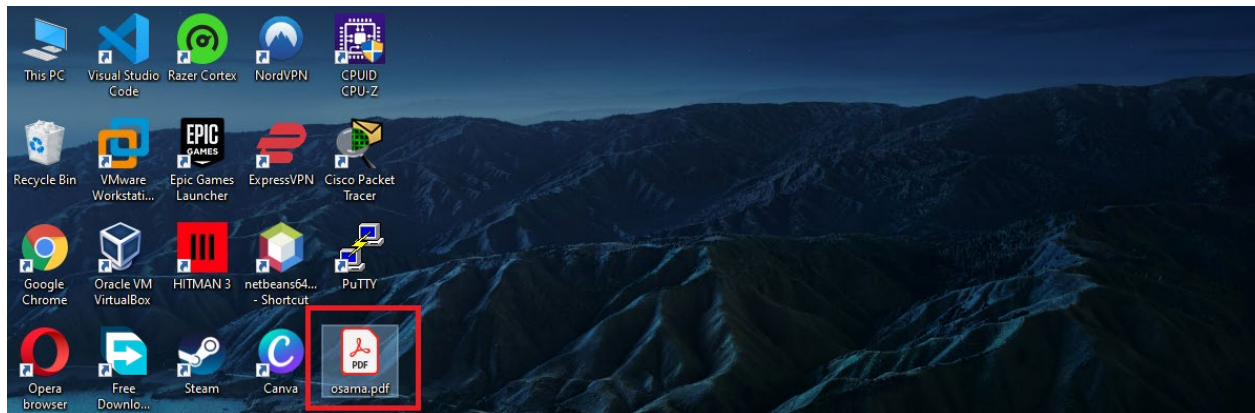


Figure 37: File download and save to the specified path successfully

After that I create the new text file “20i-1955_TestFileToUploadToBucket.txt” to upload or put that file to my object storage using the put-object command.

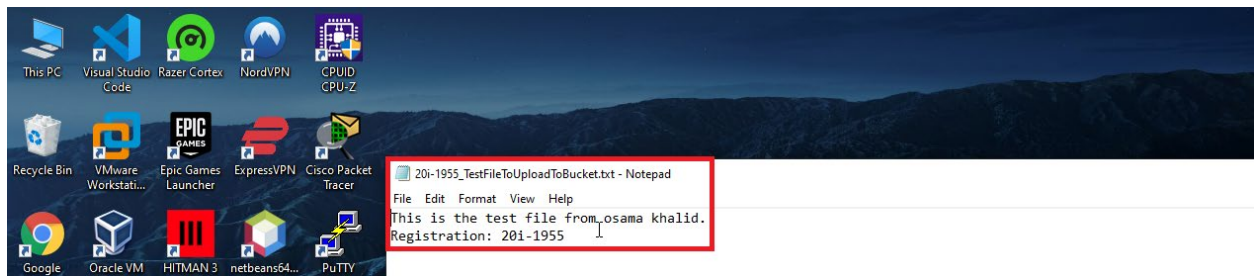


Figure 38: Creating new file to put in the object storage

```
Command Prompt
C:\Users\osama>cd Desktop
C:\Users\osama\Desktop>ibmcloud cos put-object --bucket 20i-1955 --key 20i-1955_TestFileToUploadToBucket.txt
OK
Successfully uploaded object '20i-1955_TestFileToUploadToBucket.txt' to bucket '20i-1955'.
C:\Users\osama\Desktop>
```

Figure 39: File uploaded to the object storage successfully

After that to verify that my file was upload to the bucket or not I use the `list-object` command and find that my file was uploaded to the object storage successfully also I go to the bucket page and verify it from there.

```
Command Prompt
C:\Users\osama>cd Desktop

C:\Users\osama\Desktop>ibmcloud cos put-object --bucket 20i-1955 --key 20i-1955_TestFileToUploadToBucket.txt
OK
Successfully uploaded object '20i-1955_TestFileToUploadToBucket.txt' to bucket '20i-1955'.

C:\Users\osama\Desktop>ibmcloud cos list-objects --bucket 20i-1955
OK
Found 3 objects in bucket '20i-1955':

Name                                     Last Modified                               Object Size
20I-1955-Muhammad Osama Khalid.pdf      Jun 07, 2021 at 18:09:47                   548.99 KiB
20I-1955-MuhammadOsamaKhalid.pdf        Jun 08, 2021 at 16:51:49                   548.99 KiB
20i-1955_TestFileToUploadToBucket.txt   Jun 08, 2021 at 16:58:51                     0 B

C:\Users\osama\Desktop>
```

Figure 40: Updated List of objects in the bucket

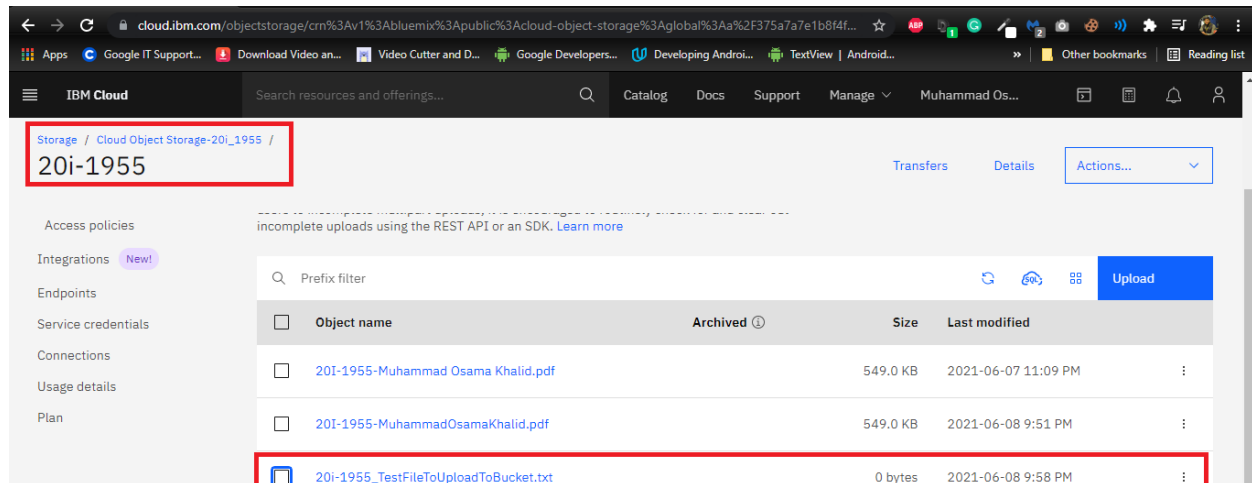


Figure 41: Data in the bucket