IBM i Backups with IBM Power Virtual Server

An IBM Systems Lab Services Tutorial

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Chapter 1: Solution Overview

Introduction

A key client expectation of IBM Power Virtual Server (PowerVS) is the ability to deploy a similar backup strategy to the one they use on-premise for their IBM i workloads. Most clients employ a strategy of weekly or monthly full-system backups, combined with more frequent library- or object-level backups.

PowerVS provides IBM i clients with similar capabilities. However, **the method and interfaces in PowerVS are somewhat different** from those on-premise.

This tutorial will provide step-by-step instructions for performing full-system or object-level backups in IBM i in three common scenarios.

Use Cases

Full-system Snapshot and Restore

In this case, we will provide examples of how to use the new snapshot/restore application programming interfaces (APIs) to perform full-system image backups.

Full-system Backups

Here we will show how to perform full-system saves and restores using Backup, Recovery and Media Services (BRMS) and IBM Cloud Object Storage (COS).

Object-level Backups

Lastly, we will demonstrate how to perform library- and object-level saves and restores using Backup, Recovery and Media Services (BRMS) and IBM Cloud Object Storage (COS).

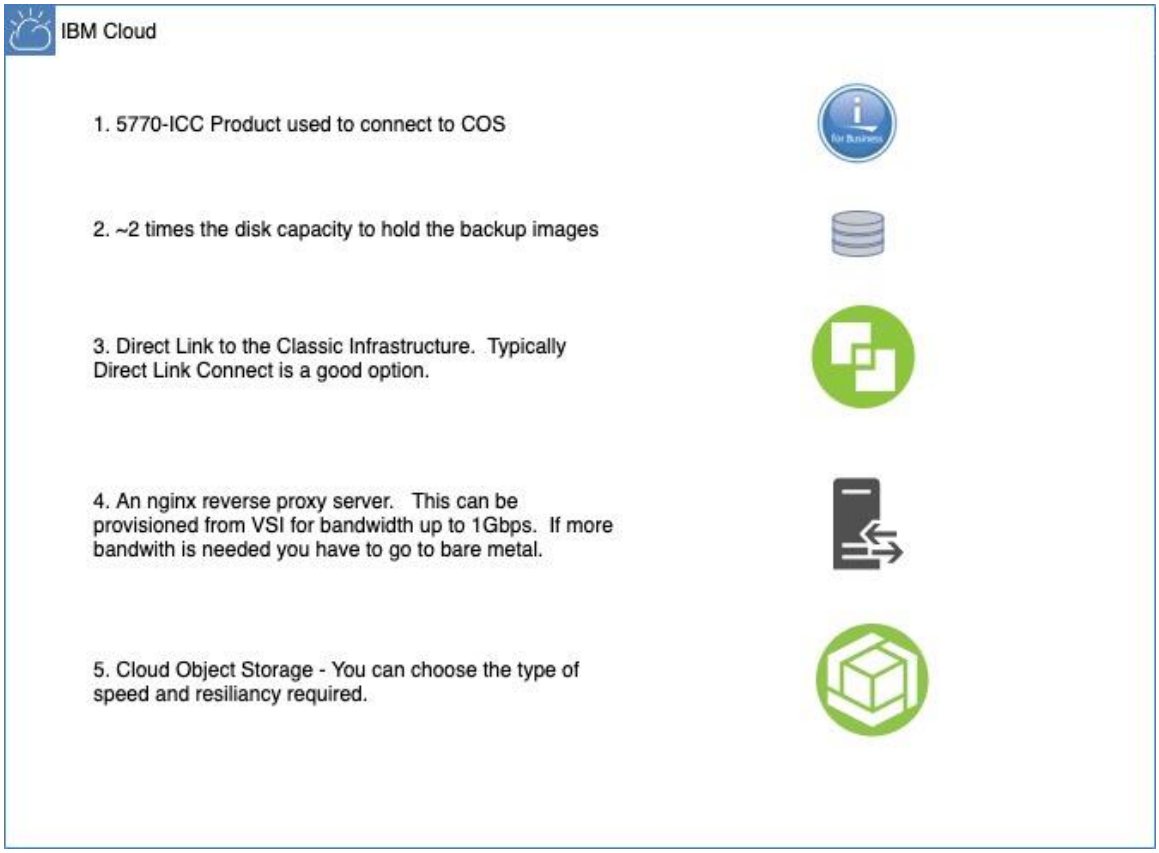
Solution Components and Requirements

Components

The following components need to be setup in the IBM Cloud UI.

1. *Open an IBM Cloud account*
2. *Create one or two Power PowerVS location Services and a private subnet in each PowerVS location.*
3. *Provision AIX or IBM i VSIs in each PowerVS location*
4. *Order Direct Link Connect Classic to connect each PowerVS location to IBM Cloud*
5. *Create and configure a Reverse-proxy Centos VSI to connect each PowerVS location to IBM Cloud*

Components to IBM i backup in the Cloud



Requirements

Open an IBM Cloud account

Login to https://cloud.ibm.com and follow the procedure to open an Internal to external account.
For internal accounts, you can use your IBM intranet ID and password. For external accounts you will need to provide a billing source such as a credit card.

Create PowerVS location Service and Subnet(s)

All Power VSIs are provisioned in what is called a PowerVS location. This is a separate datacenter adjacent to IBM Cloud datacenters. In order to setup your PowerVS location, you will setup a PowerVS location service in the IBM Cloud UI. The PowerVS location service is a service within IBM Cloud which allows you to provision Power AIX and IBM I VSIs. There is a limit of one PowerVS location service per datacenter in IBM

Cloud. In our scenario we have created two PowerVS locations, one is Toronto and one in London datacenters.
Prior to provisioning Power VSI in the PowerVS location, you will need to create at least one subnet. You can have as many subnets as you require in each PowerVS location service on which you can provision your Power VSIs.

Provision AIX or IBM i VSIs in each PowerVS location

In each PowerVS location service you can create AIX or IBM i VSIs. The details are provided in the next section.

Order Direct Link Connect Classic to connect PowerVS location to IBM Cloud

You will need to order Direct Link (DL) Connect Classic to allow your Power VSIs to communication with Linux/Window VSIs in IBM Cloud and also with all other IBM Cloud services such as VMWare VMs, and Cloud Object Storage (COS). Ordering a DL may take 1-2 weeks to complete. There is no charge for this service as of June 2020.

IBM i Software Requirements

This solution requires that product IBM Cloud Storage Solutions for i is installed on the system and the following BRMS PTF(s) must be installed on a stand-alone BRMS system or on **all** the systems in a BRMS network:

- 7.3 - SI61153
- 7.2 - SI61152
- 7.1 - SI61151

NOTE: If a BRMS network contains a 6.1 system please contact a service representative before applying the PTF(s) to any of the systems in the BRMS network.

IBM Cloud Storage Solutions for i Direct Link (DL) Reverse Proxy Server Support. Support Google Cloud Storage.

5733ICC V1R2M0

- *SI73401 - Cloud Storage Solutions Proxy Support*

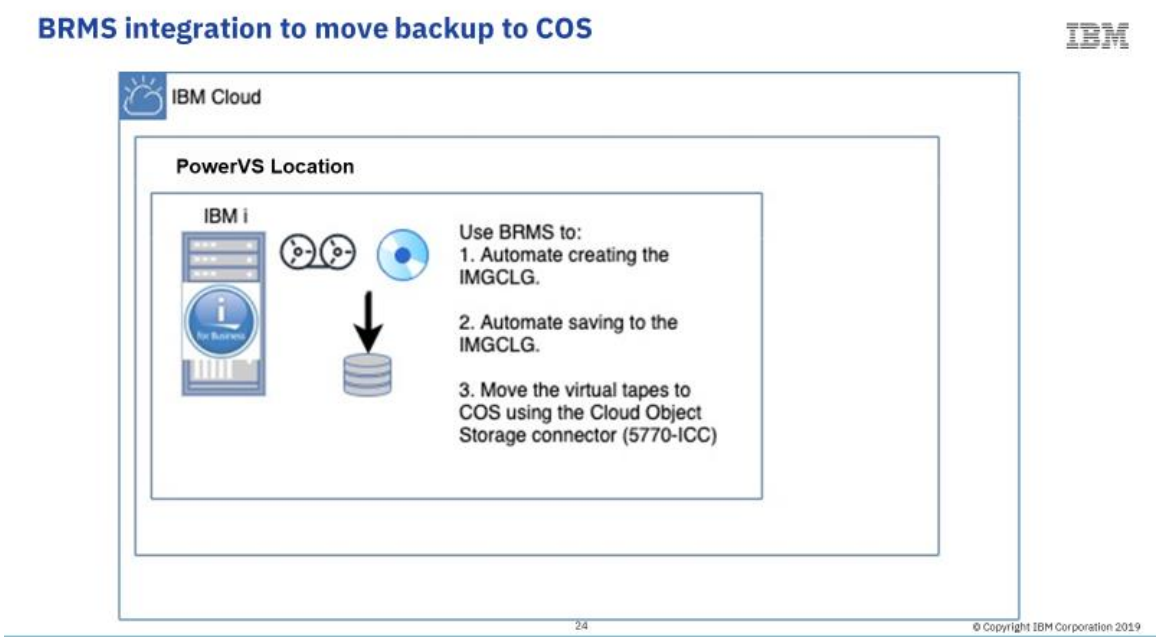
BRMS Recovery Reports

As with other recoveries that are performed using BRMS, a recovery report is used to assist with successful recoveries from save media that has been transferred to the cloud. You will need the following two reports:

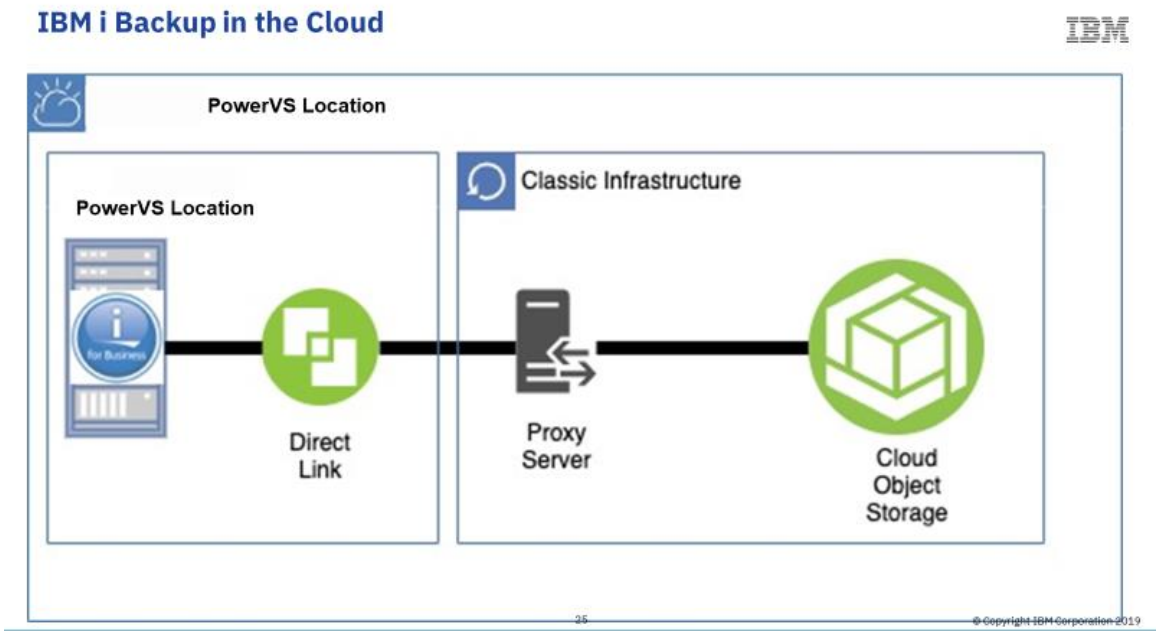
- *Recovery Report QP1ARCY*
- *Recovery Volume Summary Report QP1A2RCY*

Diagrams

BRMS integration to move backup to COS

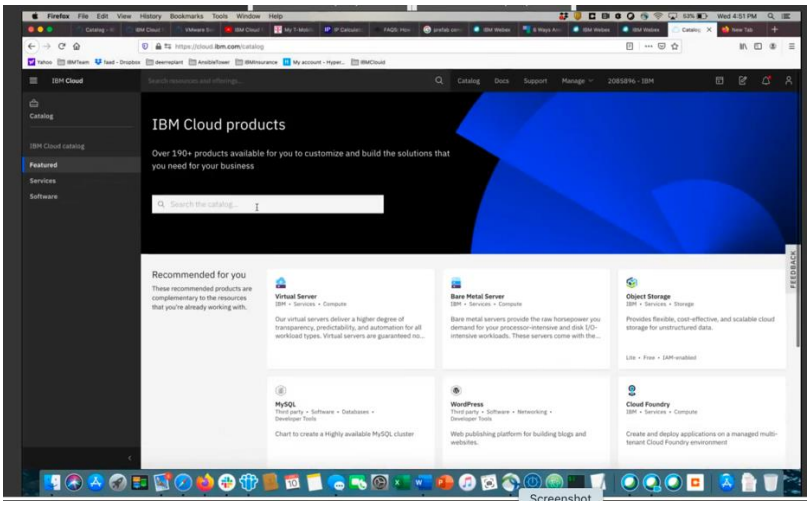


IBM i Backup in the Cloud

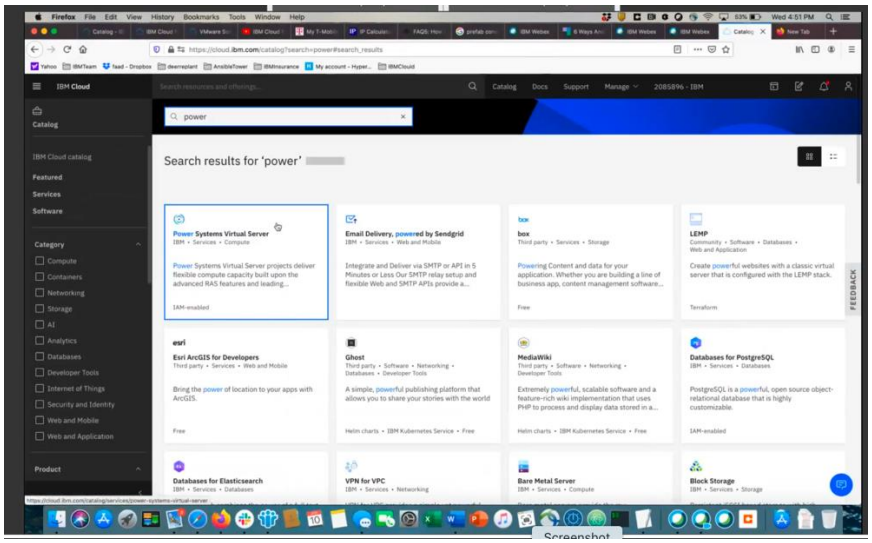


Create PowerVS location Services and Subnet(s)

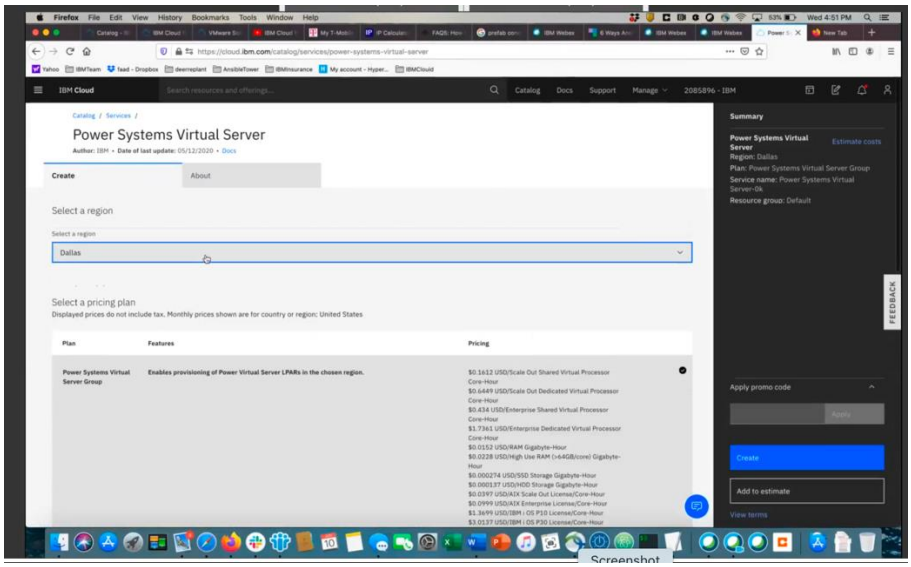
You will need an IBM Cloud account to start this process.
Go to the main IBM Cloud UI page and click on “Catalog” on upper right side of the UI.



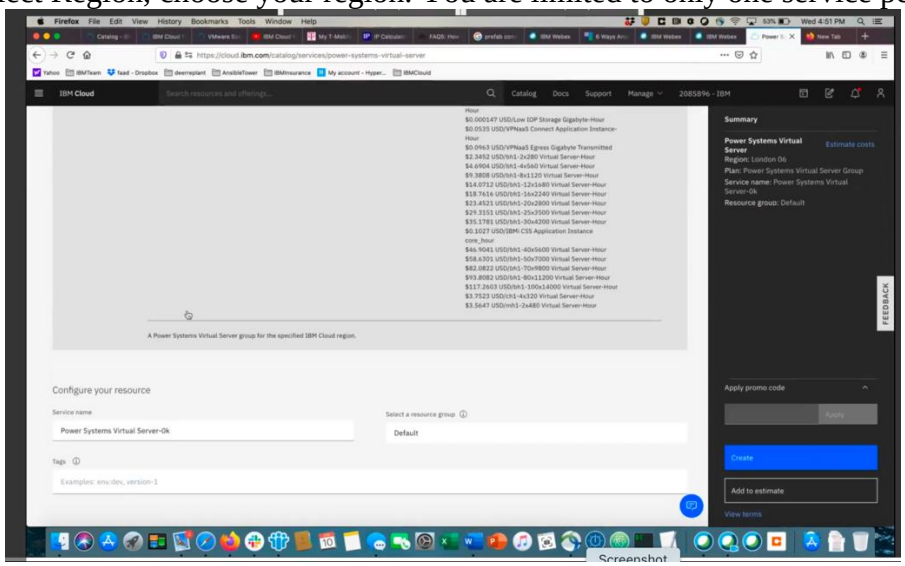
Search for “Power”



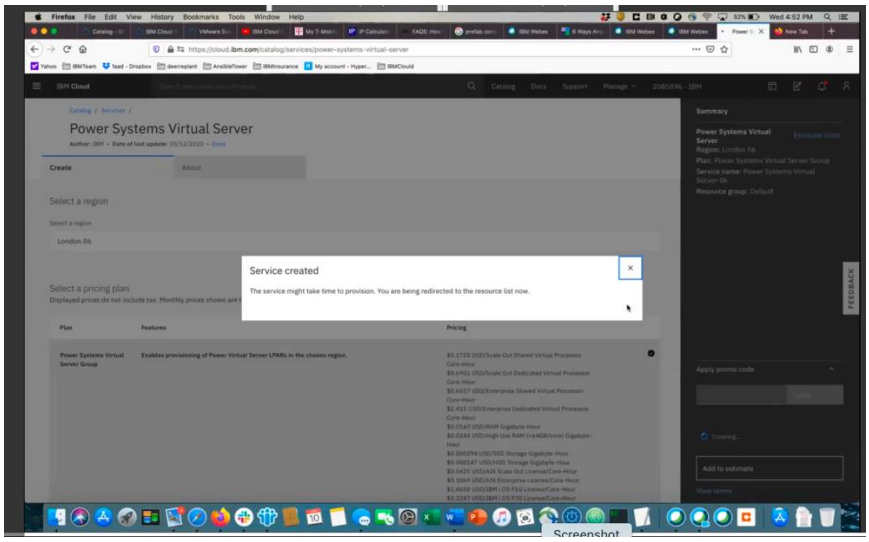
Select “Power System Virtual Servers”.



Under Select Region, choose your region. You are limited to only one service per region.

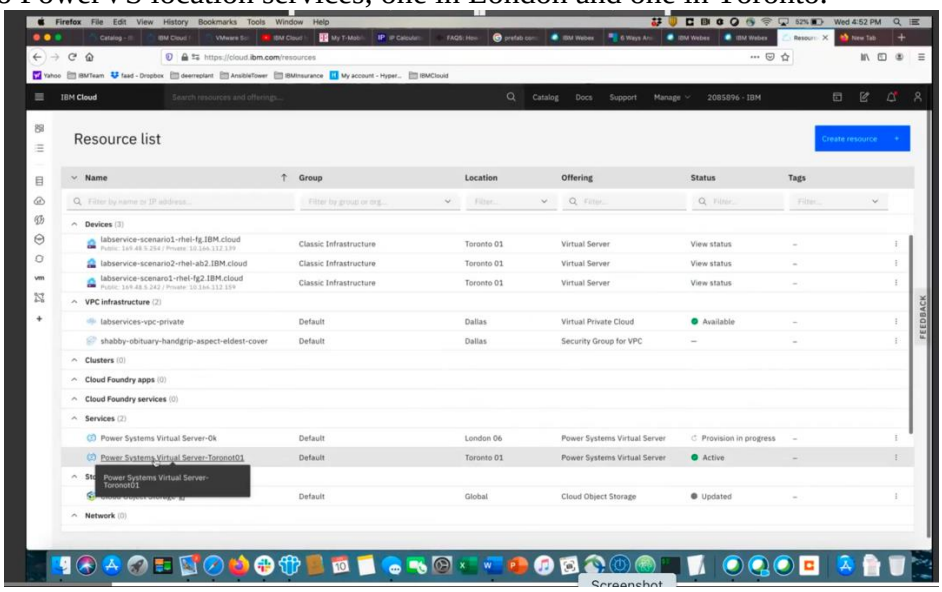


Select a “Service Name” or chose default name provided.
Then press “Create”

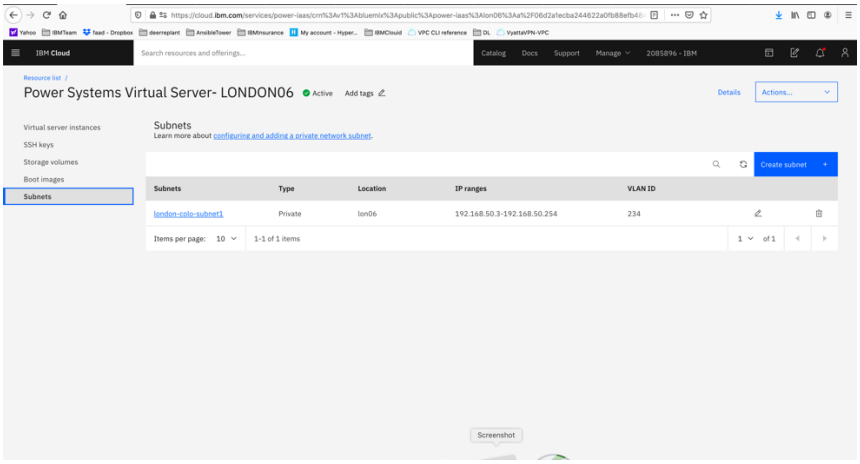


Your PowerVS location service will now appear under the Services tab.

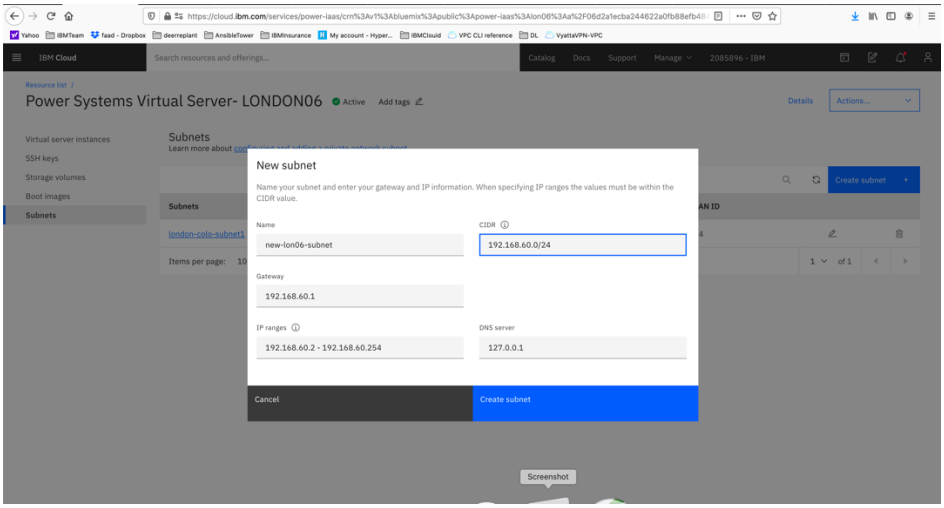
You will repeat this process to create a second PowerVS location service. In our case we have two PowerVS location services, one in London and one in Toronto.



Next you will need to click on the PowerVS location Service you created and provision a subnet to be used by your Power VSI servers.



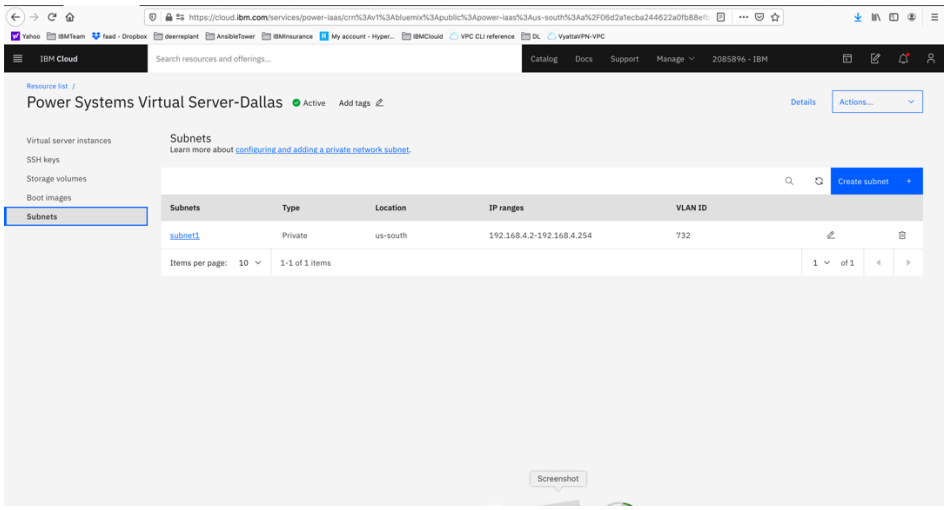
Choose “Subnets” from the menu on the left.



Provide the following information:

- *name for your subnet*
- *CIDR range. This can be any private IP subnet ranges. For example, 192.168.5.0/24. You may choose /21 to /30 based on how many IPs you will require. You may use your own private CIDR if you wish.*
- *The rest of the fields will be automatically populated based on the CIDR you provided.*

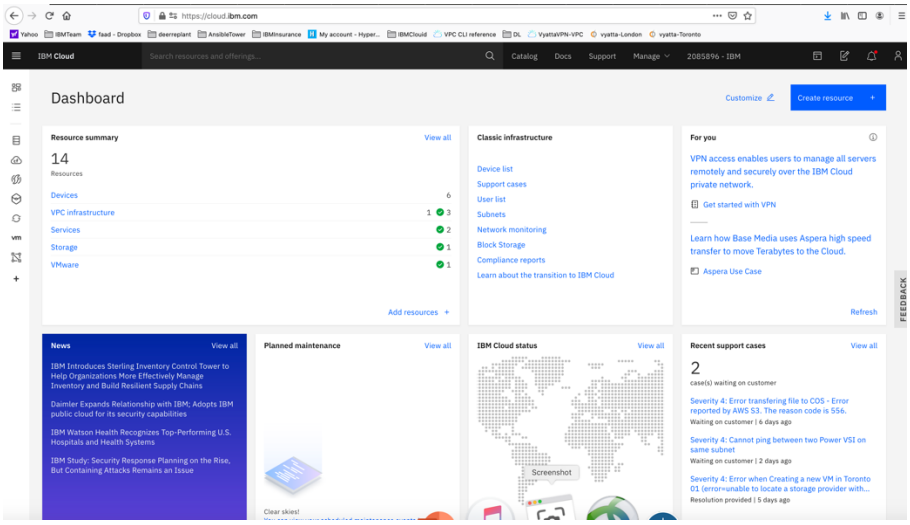
Press “Create Subnet”



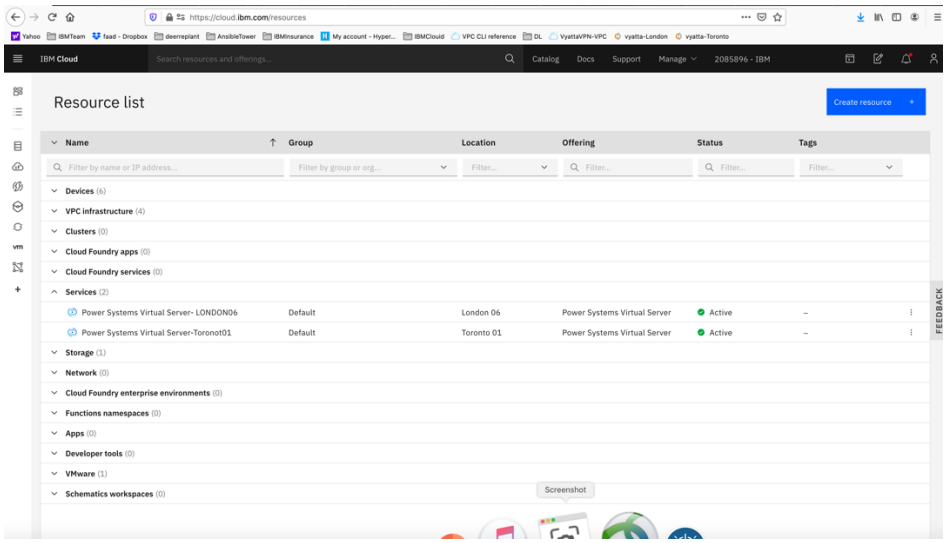
There should be a VLAN ID associated with the subnet.
At this point, you will need to open a Support Ticket with Power System to request that the subnet be configured to allow local communication between any Power VSI you create in this PowerVS location service. Provide your PowerVS location service location, and your subnet in the ticket.
Without this step, the Power VSI you create will not be able to ping between each other even if they are on same subnet in the same PowerVS location.

Provision AIX or IBM i VSIs in each PowerVS location

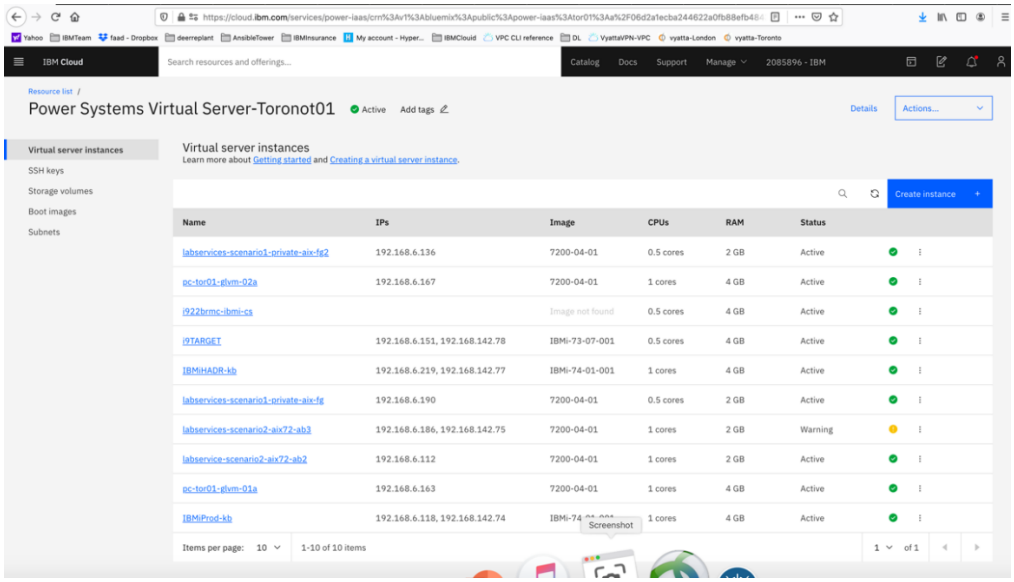
The procedure is similar for both AIX and IBM i VSI provisioning. Here is a procedure to create an AIX 7.2 VSI. The cost shown are monthly costs, but you are being charged hourly.
Go to the IBM Cloud Catalog and press the “IBM Cloud” on top left side of the UI.



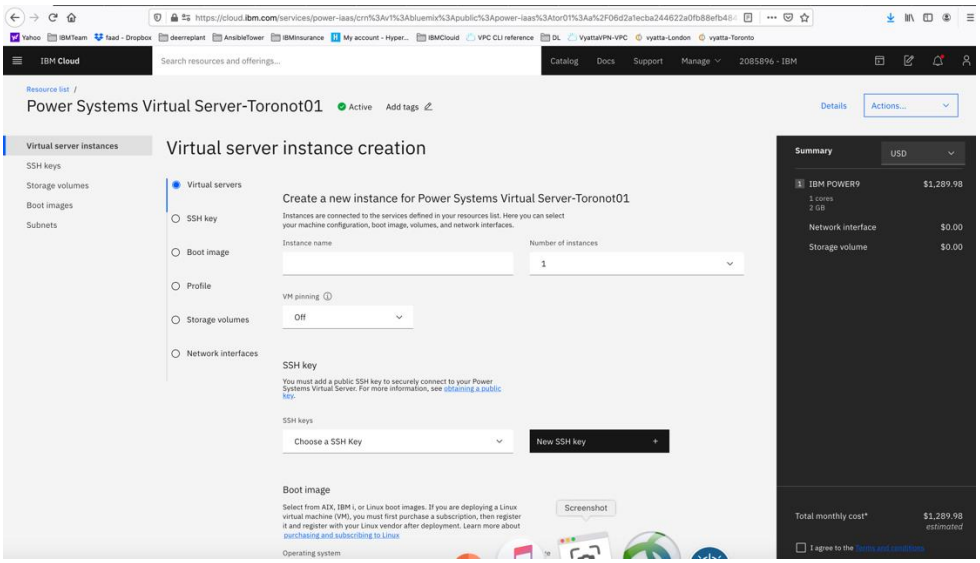
Choose “Services” from the list shown.



Click on the service for datacenter in which you have created a PowerVS location power service. In this case we will choose Toronot01 PowerVS location service.

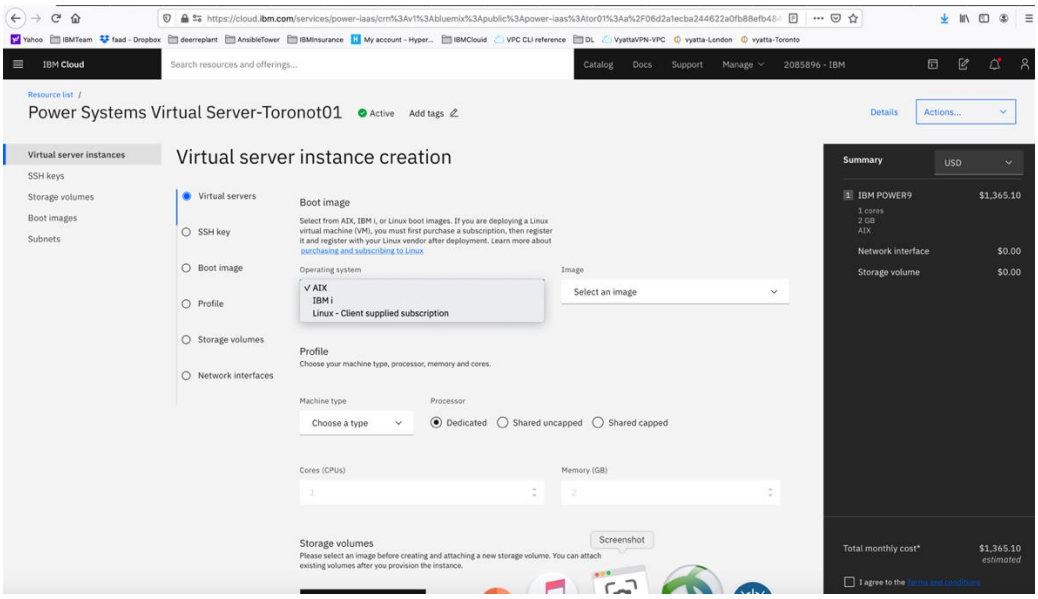


Since we have already provisioned several VSIs, we see the list show above. If you are creating VSIs for the first time, your list will be empty.
Press “Create Instance” on upper right-hand side.

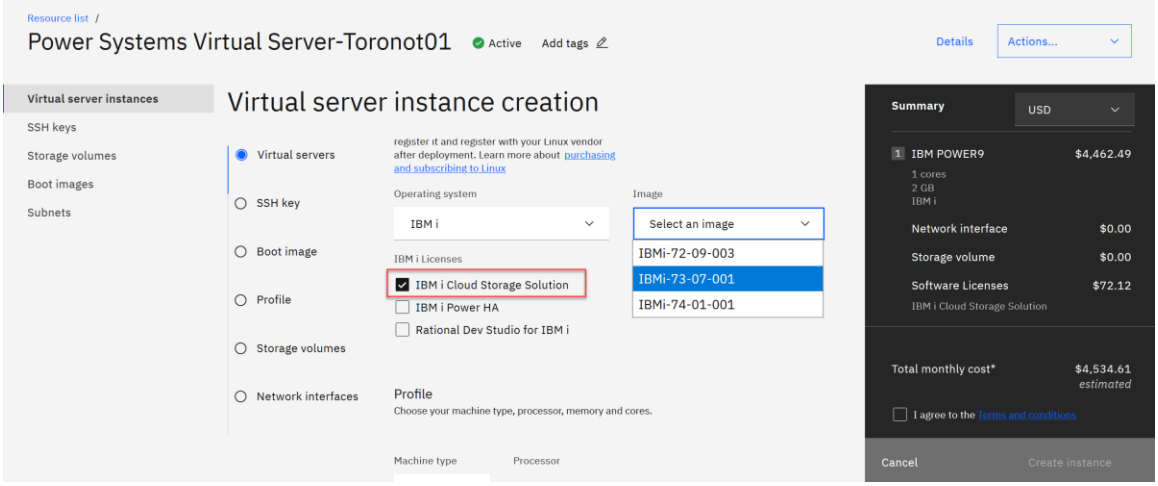


This is where you provision AIX or IBM i VSIs.
Choose a name for your VSI, i.e., AIX-72-Tor01 and select how many VSIs you need to configure. The names of the VSI will be appended with a “-1”, “-2” etc. if you select more than one VSI.
You may leave VM pruning and SSH key as is since the VSIs will have no passwords when you create them for the first time. You will need to create a password via the OS command.

Scroll down to choose other options.



On IBM i VSIs, scroll down and choose “IBM i Cloud Storage Solutions” in order to perform backups using Backup Recovery and Media Services (BRMS) to Cloud Object Storage (COS).

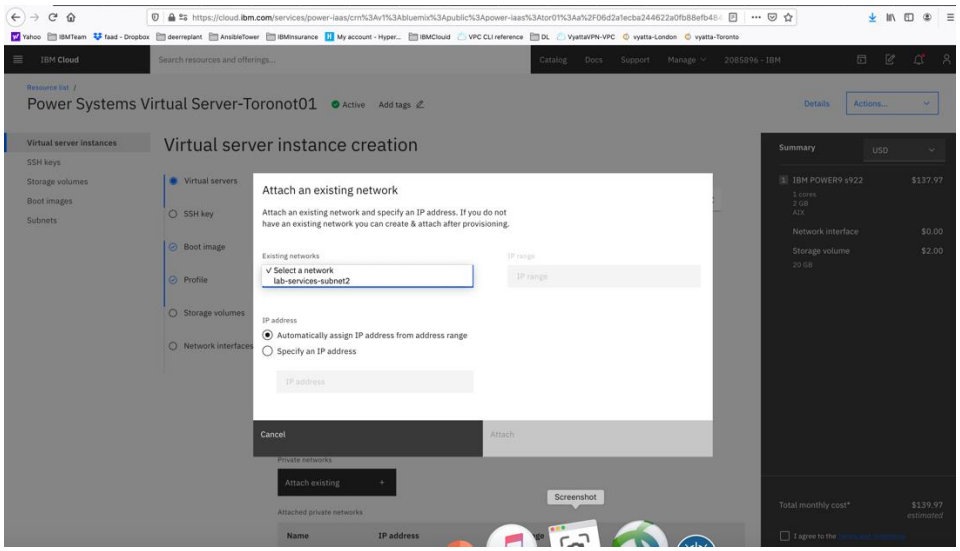


Here you will choose the following options:

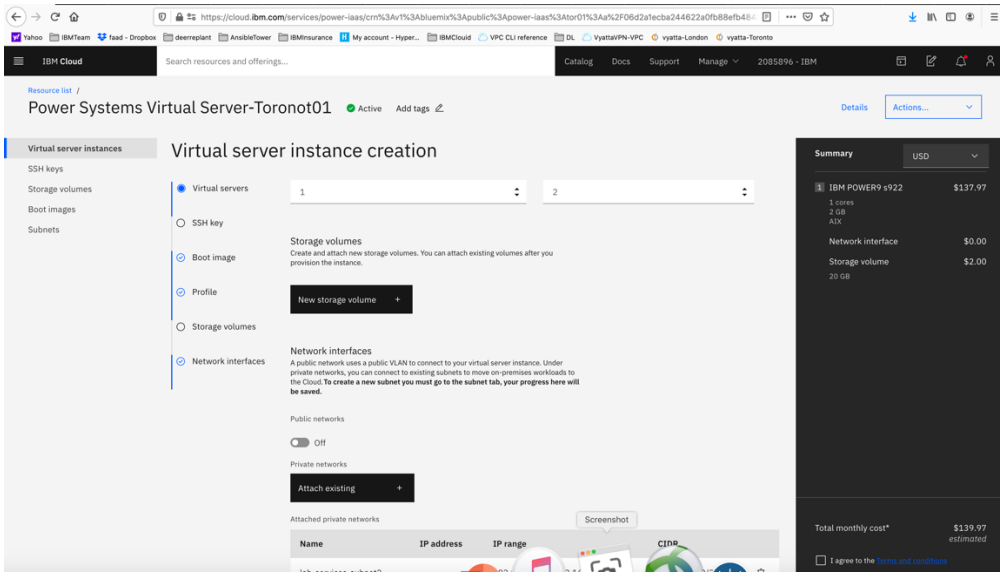
- *Operating System – AIX or IBM i or any other image you may have imported via the “Boot Image” menu on the left.*
- *Image type: AIX 7.1 or 7.2, IBM i 7.2, 7.3 or 7.4*
- *Disk types: Type 1 or 3. Type 3 is a less expensive option which we selected.*
- *Machine type: S922 or E980. S922 is what we selected.*
- *Processor: Dedicated or Shared or Shared Capped. We choose “shared” as its less expensive.*
- *Choose the number of cores and RAM you will need. The minimum core is “0.25”.*
- *You can also attach additional volume to the VSI is you wish. We did not do that here and only used the root volume which is included.*

Next you will scroll down to choose your subnet on which these VSIs will be provisioned. It is assumed you have already created one or more subnets prior to this step.

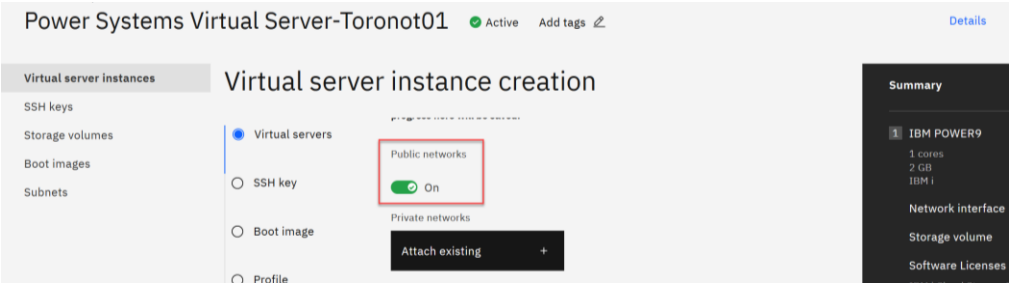
Click on the “Attached Existing” under networks.



Choose the subnet you wish to attach, and the press “Attach”



Choose “Public networks” if you wish to attach to a public network, and change to “On”



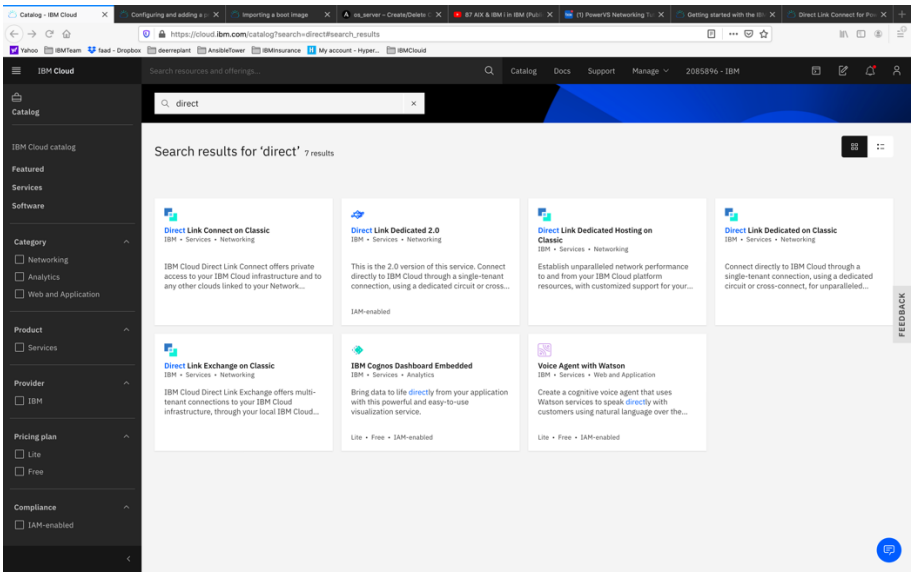
Now check the box “I agree to the ….” And press “create Instance” in lower right-hand side.
Your VSI is now being provisioned.

Order Direct Link Connect Classic to connect PowerVS location to IBM Cloud

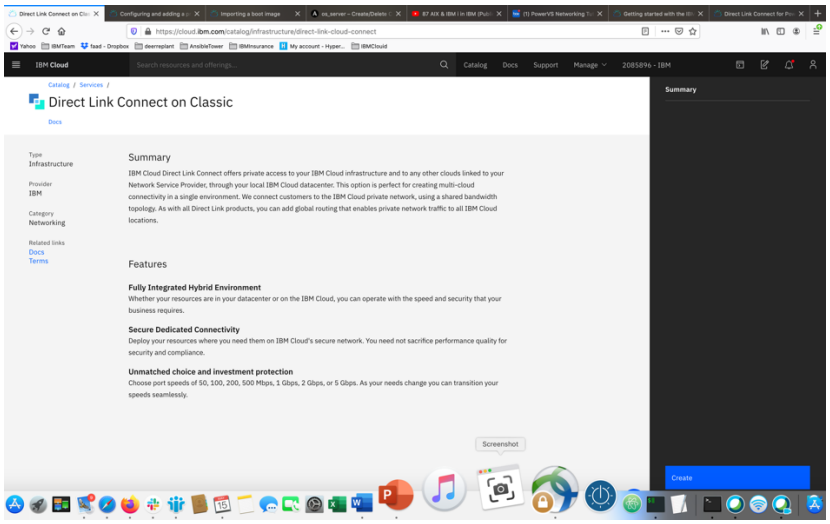
You will need to order Direct Link (DL) Connect Classic to allow your Power VSIs in the PowerVS location to communication with Linux/Window VSIs in IBM Cloud and also with all other IBM Cloud services such as Cloud Object Storage and VMware services. This process may take 1-2 weeks to complete.
There are several steps involved in completing DL ordering:

- *Order Direct link connect classic service on IBM Cloud UI – see steps below*
- *Next a support ticket will be created, and Support will send you a word document with questionnaires to be completed concerning various DL settings.*
- *Complete the questionnaires and upload it to support in the ticket.*
- *Support will then request that you create a new support ticket with the Power System so they can complete their side of the DL provisioning. Attach information about the DL in the original ticket to this ticket.*
- *The DL will be provisioned, and you will be notified when complete.*
- *You can now test connection to any Linux/Windows VSI you may have in IBM Cloud and other IBM Cloud services.*

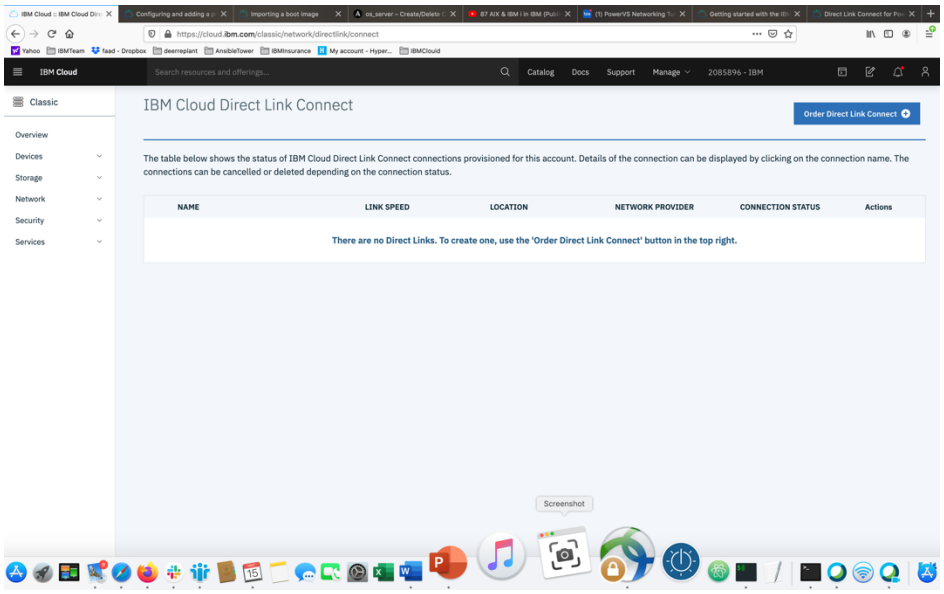
To start the DL order process, go to IBM Cloud UI and log in.
Choose “Catalog” from upper right-hand side, and search for “direct”.



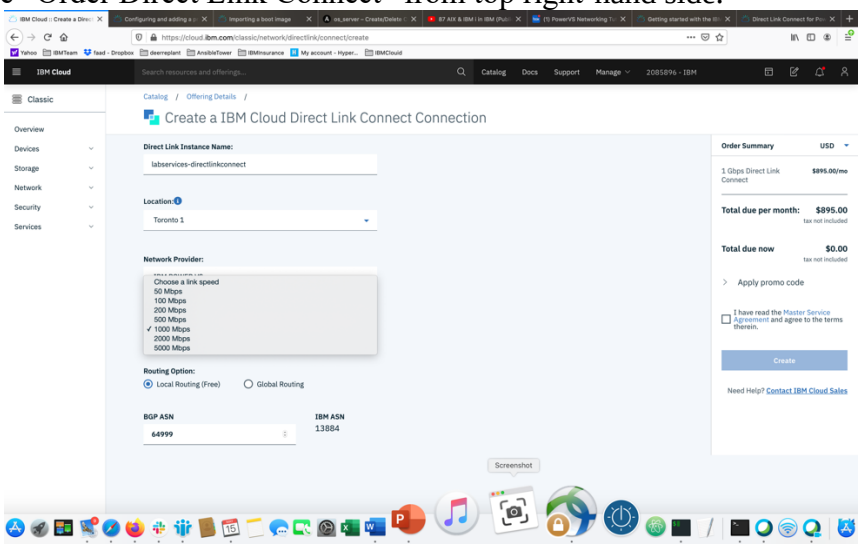
Select “Direct Link Connect on Classic”.



Press “Create”. There are no options to select.



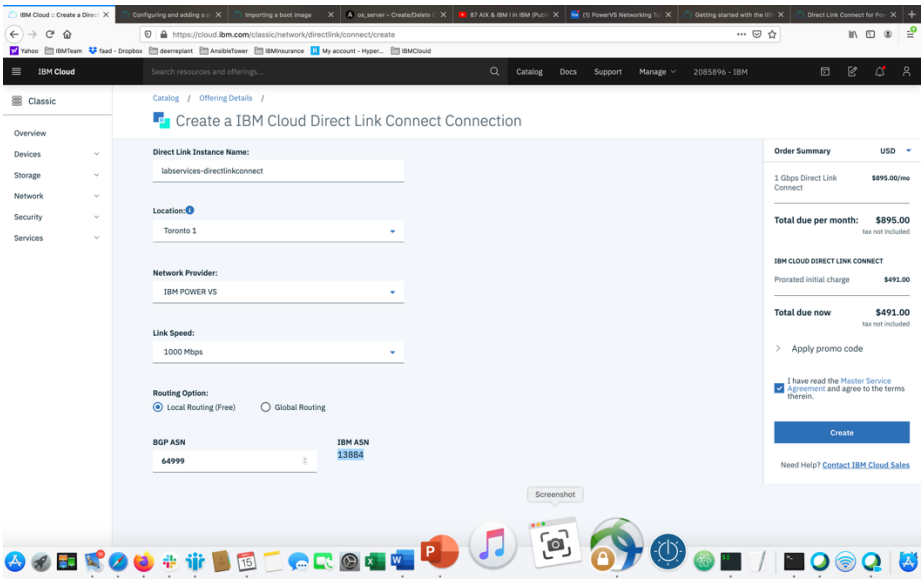
Now choose “Order Direct Link Connect” from top right-hand side.



- *Choose a “name” for the DL.*
- *Choose a location for the DL. This should be the same location as where you created your PowerVS location Service.*
- *Choose “link speed” under network provider menu.*
- *Choose “Local Routing (free)”*

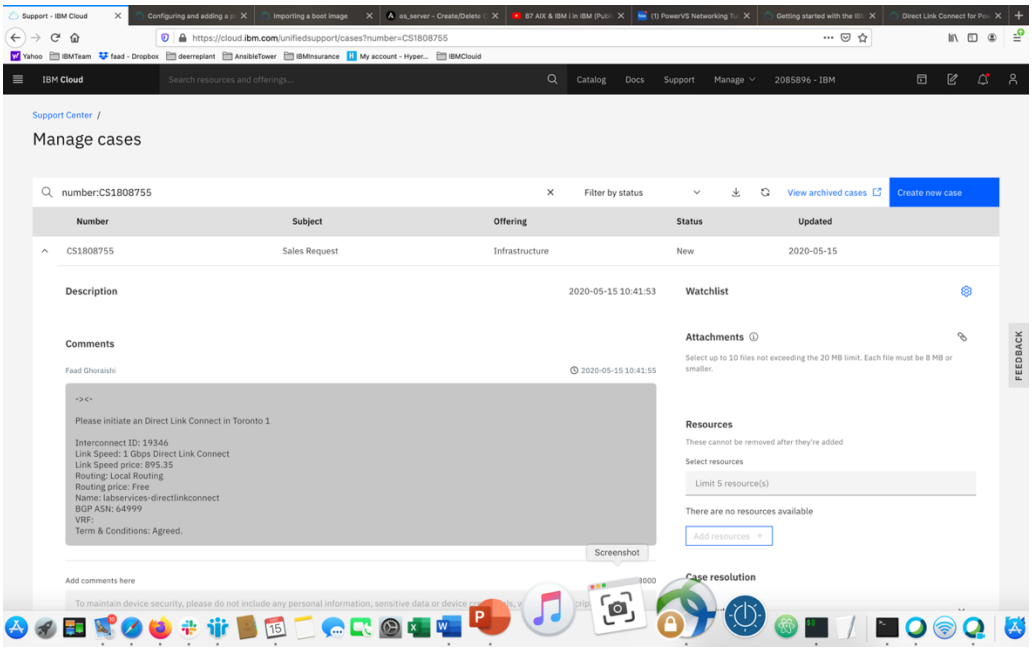
Global routing will require additional charges and will allow for easier PowerVS location-to-PowerVS location communication. You will also need to order a Vyatta Gateway Router to complete your Global routing option via use of a GRE tunnel. Support can help you with this further.

In our case, we decided to use Local Routing and then order a Vyatta Gateway in each PowerVS location and provision a GRE tunnel end-to-end.



- *Check the box to accept the offer and press "Create"*

A support case will be opened with the information required.



After this is complete, you will then be contacted by support and requested to complete and answer some questions in an attached document and send it back as attachment to the same ticket.

After this step is complete, support will request that you open a new IBM support ticket and address it to the Power System. Include the information in the original DL ticket. This new ticket will be sent to the PowerVS location support to configure their side of the DL connection.

This should be the last step before DL communication works. You can test your connection by pinging IBM Cloud Linux/Windows VSI from your Power VSIs and in reverse.

Configure a Reverse-proxy Centos VSI

We used the official IBM cloud procedure to configure the reverse-proxy server.
https://cloud.ibm.com/docs/direct-link?topic=direct-link-using-ibm-cloud-direct-link-to-connect-to-ibm-cloud-object-storage

- *You will need to first provision a Centos VSI in IBM cloud with both public and private interface.*
- *Login to the VSI.*
- *Upgrade your operating system OS (yum update).*
- *Install the EPEL repository (yum install epel-release).*
- *Install NginX (yum install nginx).*
- *Start nginx (systemctl start nginx or just nginx)*
- *To allow service to run after reboot: systemctl enable nginx*

Now Test your nginx deployment:
Open a browser and put in the following URI.

http://<IP address of the Centos VSI>

Now we will customize this nginx deployment to allow COS access.

- *Make a backup of nginx.conf*
- *Replace the nginx.conf with nginx.conf file shown below. Keep the same name: nginx.conf*

https://cloud.ibm.com/docs/direct-link?topic=direct-link-using-ibm-cloud-direct-link-to-connect-to-ibm-cloud-object-storage

- *Generate ssl self-signed keys:*

  Login to the Centos vs
  cd to root

  provide unique value for items in RED.
  openssl genrsa -des3 -passout pass:test123abc -out acstest.key 2048

  This command will generate a file called acstest.key in your present directory.

  Next:
  Item in blue is from the previous command output file name.
  Items in red you will need to provide with your own information.

  openssl req -new -newkey rsa:2048 -nodes -keyout acstest.key -out acstest.csr

  [root@centos-reverseproxy-tor01-fg ~]# openssl req -new -newkey rsa:2048 -nodes -keyout acstest.key -out acstest.csr
  Generating a 2048 bit RSA private key
  ...+++
  .....+++
  writing new private key to acstest.key'

  You are about to be asked to enter information that will be incorporated
  into your certificate request.
  What you are about to enter is what is called a Distinguished Name or a DN.
  There are quite a few fields, but you can leave some blank
  For some fields there will be a default value,
  If you enter '.', the field will be left blank.

  Country Name (2 letter code) [XX]:us
  State or Province Name (full name) []:pa
  Locality Name (e.g., city) [Default City]:Philadelphia
  Organization Name (e.g., company) [Default Company Ltd]:IBM
  Organizational Unit Name (e.g., section) []:labser
  Common Name (e.g., your name or your server's hostname) []:centos-reverseproxy-tor01-fg
  Email Address []:faad.ghoraishi@ibm.com

```
Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:test123
An optional company name []:
[root@centos-reverseproxy-tor01-fg ~]#
```

Next:
Items in blue are two files generated from previous command.
Now this command will generate the .crt file which you need.

```
openssl x509 -req -sha256 -days 365 -in acstest.csr -signkey acstest.key -out
acstest.crt

[root@centos-reverseproxy-tor01-fg ~]# openssl x509 -req -sha256 -days 365 -in
labser.csr -signkey labser.key -out labser.crt
Signature ok
subject=/C=us/ST=pa/L=philadelphia/O=ibm/OU=labser/CN=centos-
reverseproxy-tor01-fg/emailAddress=faad.ghoraishi@ibm.com
        Getting Private key
```

copy these files to location shown in the above link.

- *cp acstest.key /etc/pki/tls*
- *cp acstest.crt /etc/pki/tls*
- *Edit nginx.conf file and add the new acstest.key and acstest.crt file to the path in the file.*
- *Proxy_Path: use the private endpoint of COS at IBM cloud.*
    - *https://s3.private.us-east.cloud-object-storage.appdomain.cloud;*
- *Save the file*

The final nginx.conf looks like this. This file looks different than what is in the above IBM link. We had to add additional fields to make it work for IBM i COS interface via this reverse-proxy. Items shown in Red are the ones which may need to be updated. This also now works for AIX, so we will use this nginx.conf file.

```
user nginx;
worker_processes auto;
error_log /var/log/nginx/error.log;
pid /run/nginx.pid;

events {
   worker_connections 1024;
}

http {
   log_format main '$remote_addr - $remote_user [$time_local] "$request" '
                   '$status $body_bytes_sent "$http_referer" '
                   '"$http_user_agent" "$http_x_forwarded_for";

   access_log  /var/log/nginx/access.log main;


 sendfile          on;
   tcp_nopush        on;
   tcp_nodelay       on;
   keepalive_timeout  300;
   types_hash_max_size 2048;

   include           /etc/nginx/mime.types;
   default_type      application/octet-stream;
   ssl_session_cache shared:SSL:1m;
   ssl_session_timeout  10m;
   ssl_ciphers HIGH:!aNULL:!MD5;
   ssl_prefer_server_ciphers on;
   proxy_http_version 1.1;
   proxy_buffering off;
   proxy_intercept_errors on;

   # IBM COS Endpoints
   # https://cloud.ibm.com/docs/services/cloud-object-storage/basics?topic=cloud-object-storage-endpoints#select-regions-and-endpoints
   # FRA
   server {
      listen      443 ssl http2;
      server_name _;
      proxy_buffering off;
      client_body_buffer_size 1100M;
      client_max_body_size 1300M;
       ssl_certificate "/etc/pki/tls/acstest.crt";
      ssl_certificate_key "/etc/pki/tls/acstest.key";
      location / {
      autoindex on;
      autoindex_exact_size off;
      proxy_pass https://s3.private.us-east.cloud-object-storage.appdomain.cloud;
      proxy_set_header Host $host;
      proxy_set_header X-Forwarded-For $remote_addr;
      proxy_http_version 1.1;
      proxy_set_header Connection "";
      }

   }
}
```

Restart nginx.

- *nginx -t*
  output:
  nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
  nginx: configuration file /etc/nginx/nginx.conf test is successful

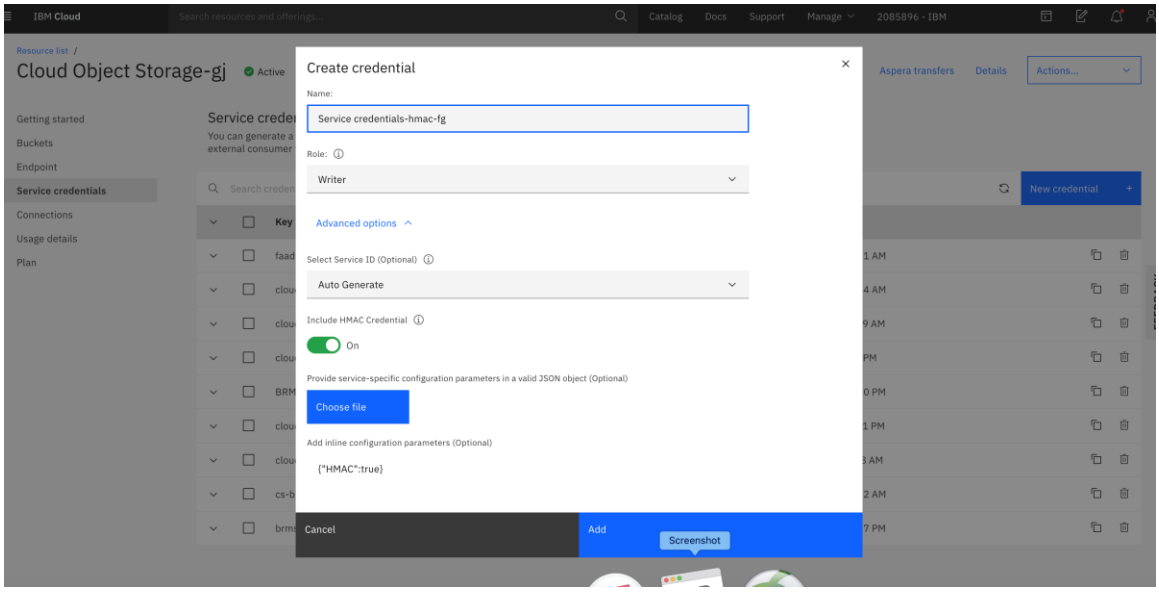
- *nginx -s quit; sleep 3; nginx*

Your Power VSI client can now submit COS requests to the IP or URLs of the NginX (proxy).

You will need to generate a HMAC credential.

https://cloud.ibm.com/docs/cloud-object-storage?topic=cloud-object-storage-uhc-hmac-credentials-main

Enter your credentials from the COS HMAC. Make sure when u create a new credential under Service Credential in COS GUI, you choose Advanced Option and check Include HMAC Credential check box.



The new credential will now show aws credential too which you used above.

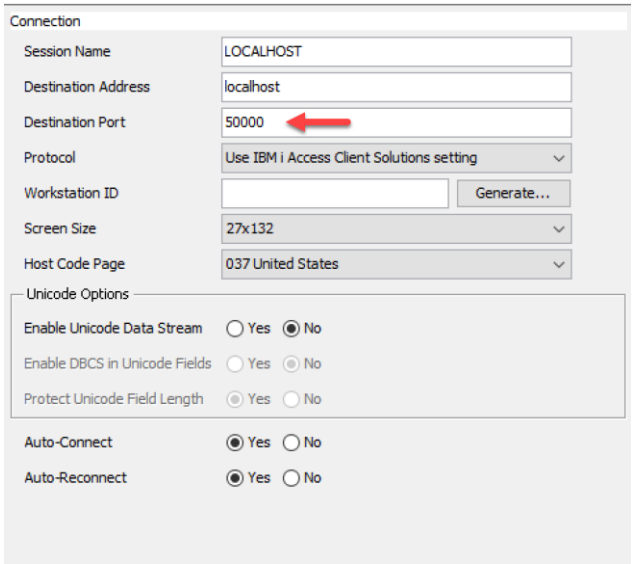
```
{
  "apikey": "2x7rTtJuYFuivMKR3C7iP3Mnausq81t6A42GZoNt6FVb",
  "cos_hmac_keys": {
    "access_key_id": "e111daebd3…….",
    "secret_access_key": "58f6de7f965ef528edc2e9…21036c8d623de"
  },
  "endpoints": "https://control.cloud-object-
storage.cloud.ibm.com/v2/endpoints",
  "iam_apikey_description": "Auto-generated for key e111daeb-d379-42ff-
aa1e-2c8b6994c71……..
}
```

Accessing the VM/LPAR from your PC without Direct Link

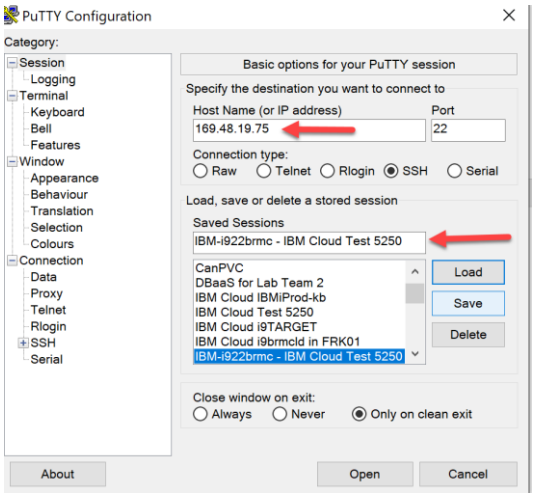
- First start the SSHD server on the VM/LPAR: STRTCPSVR *SSHD
- Start Telnet: STRTCPSVR *TELNET
- Change the following SYSVALs:
    - QAUTOVRT to something greater than 0
    - QLMTSECOFR to 0
    - *On Linux or a Mac you would run a command similar to this:*

ssh -L 50000:localhost:23 -L 2001:localhost:2001 -L 2005:localhost:2005 -L 449:localhost:449 -L 8470:localhost:8470 -L 8471:localhost:8471 -L 8472:localhost:8472 -L 8473:localhost:8473 -L 8474:localhost:8474 -L 8475:localhost:8475 -L 8476:localhost:8476 -o ExitOnForwardFailure=yes -o ServerAliveInterval=15 -o ServerAliveCountMax=3 <myuser>@<myIPaddress>

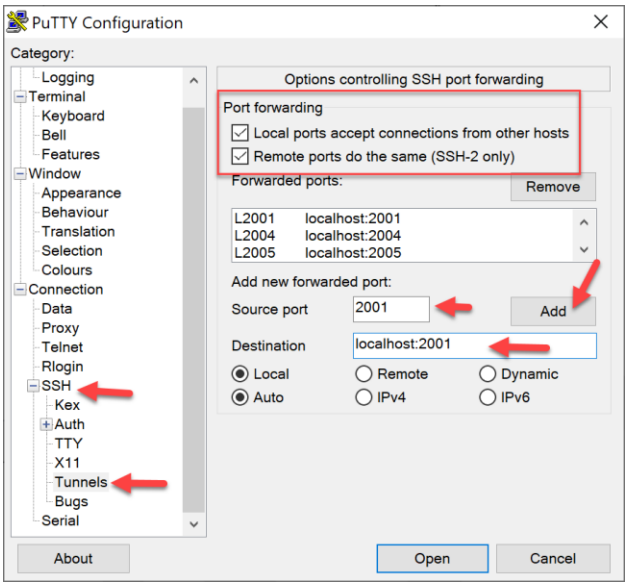
- *Note: If you have permission denied errors, you may have to use sudo in front of the ssh command.*
- *In ACS change the port to 50000 for the 5250 session:*



- On Windows you can use PuTTY to run this:
- Open PuTTY and for the Host Name use the public IP address of the VM/LPAR in the Cloud.
- Create a new name for your Session and Save.



- Select SSH>Tunnels

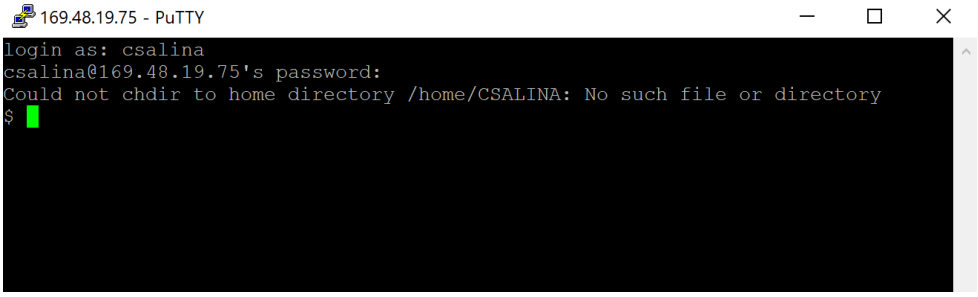


- Verify you have a check in both boxes
  - Local ports accept connections from other hosts
  - Remote ports do the same (SSH-2 only)

- Add the following new forwarded ports one at a time:

Source port	Destination
2001	localhost:2001
2004	localhost:2004
2005	localhost:2005
2010	localhost:2010
449	localhost:449
50000	localhost:23
8470	localhost:8470
8471	localhost:8471
8472	localhost:8472
8473	localhost:8473
8474	localhost:8474
8475	localhost:8475
8476	localhost:8476

- Select Sessions and Save again
- Now you can Open your new PuTTY Session
  - Login with your IBM i User ID and password
  - Leave your PuTTY Session running
  - If you close the PuTTY Session you will be disconnected from the IBM i. Just minimize the PuTTY session.

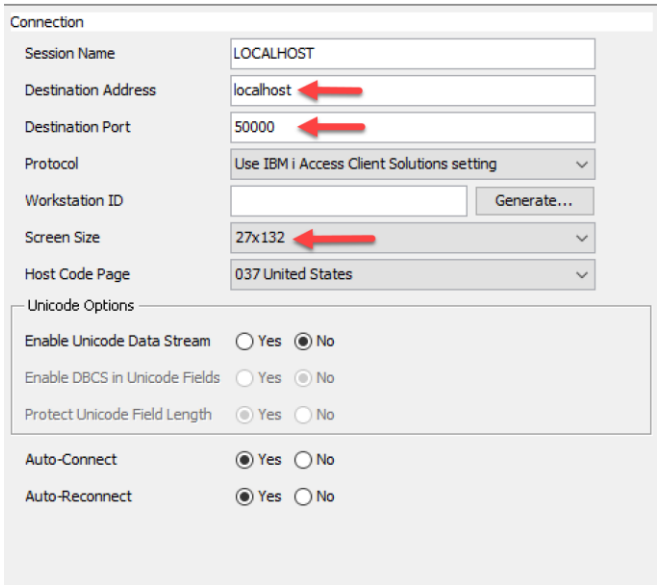


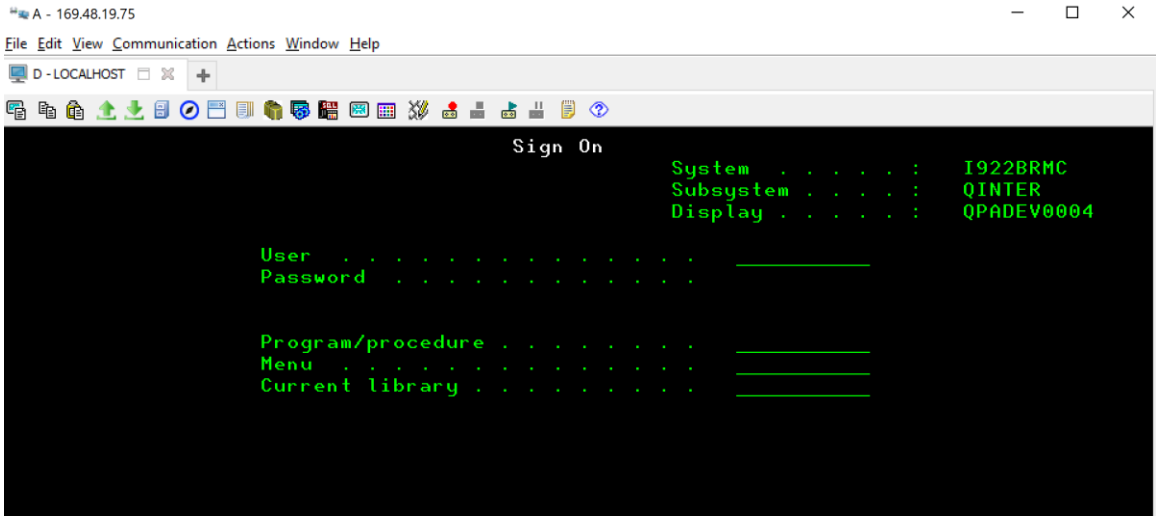
— You can now start your IBM i Client Solutions (ACS) 5250 session.

  — Destination Address = localhost

  — Destination Port = 50000

  — Screen Size = 27x132



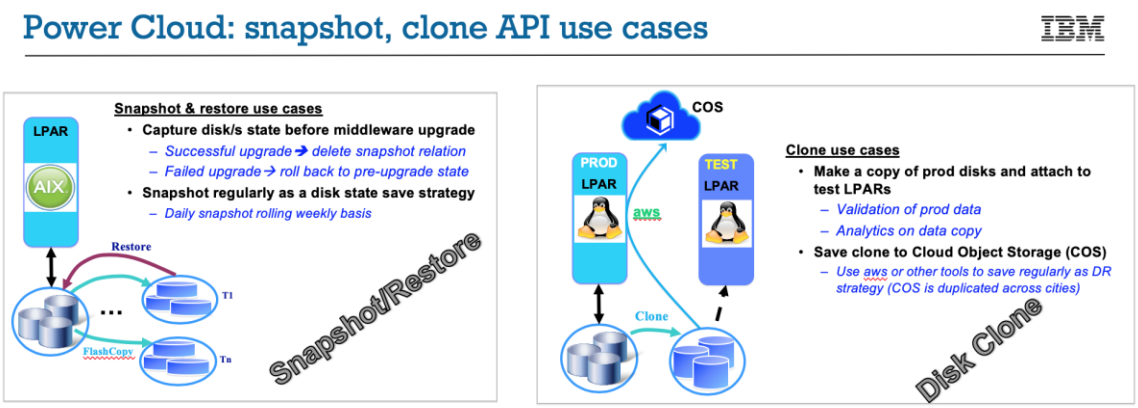


Chapter 2: Implementation

Full-system Snapshot and Restore

PowerVS recently introduced the capability to perform snapshots, restores and clones of Power Virtual Server Instances (VSIs). As of the time of this writing, the capability is available only via API.

Use Cases



Examples

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Note that these samples are AS IS and no normal support will be provided. Here is the standard text related to the sample code (applies to this document):

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```

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```


General use information about IBM Cloud PowerVS API use

Following example/sample code shows how to use Cloud API. Following sample focusses on use of VM shutdown and such operations. This sample should be modified to perform any snapshot/restore such operations.

```
#!/bin/bash

### START OF VARIABLES
API_KEY="ENTER YOUR API KEY HERE"
CLOUD_CRN="ENTER YOUR CLOUD CRN"
INSTANCE_NAME="ENTER YOUR INSTANCE NAME"
## Acceptable values are stop, start ,hard-reboot, soft-reboot
OPERATION="stop"

################
IFS=":" read -ra ADDR <<< "${CLOUD_CRN}"
CLOUD_INSTANCE_ID=${ADDR[7]}
CLOUD_URL=(${ADDR[5]}.power-iaas.cloud.ibm.com)
```

```
## FIRST WE GET THE TOKEN FROM THE CLOUD IAM SERVICE USING THE API KEY

GET_TOKEN=$(curl -X POST -H "Content-Type: application/x-www-form-urlencoded" -H "Accept: application/json" -d "grant_type=urn%3Aibm%3Aparams%3Aoauth%3Agrant-type%3Aapikey&apikey=$API_KEY" https://iam.bluemix.net/oidc/token | jq -r '.access_token')


## THIS IS THE POST CALL TO INVOKE the OPERATION
curl -X POST https://$CLOUD_URL/pcloud/v1/cloud-instances/$CLOUD_INSTANCE_ID/pvm-instances/$INSTANCENAME/action -H "CRN: $CLOUD_CRN " -H "Authorization: Bearer $GET_TOKEN" -H 'Content-Type:application/json' -d '{ "action":"'$OPERATION'" }'

sleep 30

## THIS IS A GET CALL
curl -X GET https://$CLOUD_URL/pcloud/v1/cloud-instances/$CLOUD_INSTANCE_ID/pvm-instances/$INSTANCE_NAME -H "CRN: $CLOUD_CRN " -H "Authorization: Bearer $GET_TOKEN" -H 'Content-Type:application/json'
```

Examples of Disk/Volume Snapshot/Restore/Clone operations

Pre-Conditions:

The body of the Snapshot, Restore and Clone (PVM and Volume) API would have to be modified with user defined values.

Before running the Restore API, the PVM instance would have to be SHUTOFF.

Create a new Snapshot:

```
curl -X POST https://< Cloud IP >/pcloud/v1/cloud-instances/<Cloud Instance ID>/pvm-instances/<PVM Instance ID>/snapshots \

-H "authorization: <AuthToken>" \
```

```
-H "content-type: application/json" \

-H "crn: <CRN>" \

-d "{\"name\": \"VM1-SS\",\"description\": \"Snapshotfor
VM1\",\"volumeIDs\": [\"VM1-7397dc00-0000035b-boot-
0\",\"vm1dv1\"]}"
```

Expected Response:

```
{"snapshotID":"65ea39fd-cab6-46b3-b88c-3c28479ab019"}
```

Get Snapshot Details:

```
curl -X GET https://< Cloud IP >/pcloud/v1/cloud-instances/<Cloud
Instance ID>/snapshots/<Snapshot ID>\

-H "authorization: <AuthToken>" \

-H "content-type: application/json" \

-H "crn: <CRN>"
```

Expected Response:

```
{

   "action": "snapshot",

   "creationDate": "2020-04-13T08:51:21.000Z",
```

"description": "Snapshotfor VM1",

"lastUpdateDate": "2020-04-13T08:51:54.000Z",

"name": "VM1-SS",

"percentComplete": 100,

"pvmInstanceID": "7397dc00-f328-4bfb-bef2-27200ca42cb9",

"snapshotID": "65ea39fd-cab6-46b3-b88c-3c28479ab019",

"status": "available",

"volumeSnapshots": {

"398344bb-a64d-4fd5-b3cd-14ddfea6dd0e": "72f07383-ca5b-46a0-94a2-3d1e7a7faceb",

"7a7a5b6e-1177-400a-82a4-0784957bbe75": "33f91096-f204-4ed2-8110-c497a258c29c"

}

}

Restore to Snapshot:

```
curl -X POST "https://< Cloud IP >/pcloud/v1/cloud-instances/<Cloud Instance ID>/pvm-instances/<PVM Instance ID>/snapshots/<Snapshot ID>/restore?restore_fail_action=" \

-H "authorization: <AuthToken>" \

-H "content-type: application/json" \

-H "crn: <CRN>" \

-d "{\"forceRestore\":\"false\"}"
```

Expected Response:


```
{
   "action": "restore",
   "creationDate": "2020-04-13T08:51:21.000Z",
   "description": "Snapshotfor VM1",
   "lastUpdateDate": "2020-04-13T08:55:28.000Z",
   "name": "VM1-SS",
   "pvmInstanceID": "7397dc00-f328-4bfb-bef2-27200ca42cb9",
   "snapshotID": "65ea39fd-cab6-46b3-b88c-3c28479ab019",
   "status": "available",
   "volumeSnapshots": {
      "398344bb-a64d-4fd5-b3cd-14ddfea6dd0e": "72f07383-ca5b-46a0-94a2-3d1e7a7faceb",
      "7a7a5b6e-1177-400a-82a4-0784957bbe75": "33f91096-f204-4ed2-8110-c497a258c29c"
   }
}
```

Create Volume Clone:

```
curl -X POST \
  https://<Cloud IP>/pcloud/v1/cloud-instances/<Cloud Instance ID>/volumes/clone \
  -H 'authorization: <Auth Token>' \
  -H 'content-type: application/json' \
  -H 'crn: <CRN>' \
  -d '{
"displayName": "PerfClone",
"volumeIDs": ["VMT-1422dbc9-00000063-boot-0", "vmtdv1"]
}'
```

Expected Response:

```
{
   "clonedVolumes": {
      "6342e6a9-716d-4686-b644-7f089bceb332": "fd99a7ae-3e15-4f7e-af79-f5637e9a27f8",
      "8461389f-e8fb-403f-8f48-81edcc9ef46f": "16ed7611-26cc-4b93-945d-760cd6a52c58"
   }
}
```

Create Cloud Resource – using a Direct Link Private Endpoint (*Recommended*)

This Example show how to use a Private Endpoint.

1. Create a cloud resource by running the following command:
    - **CRTS3RICC**

```
Type choices, press Enter.

Resource name  . . . . . . . . . . > TOR1CLD      Name
Resource description . . . . . . . > 'Cloud Object Storage Toronto 01'

Access key id  . . . . . . . . . . > 47035e8053054437b1dc385a5953ae43

Secret access key  . . . . . . .

Use compression  . . . . . . . . .   *NO           *NO, *YES
Use encryption . . . . . . . . . .   *NO           *NO, *YES
Bucket . . . . . . . . . . . . . . > 'brms-bucket-backupvol'
```

Note: Add https:// at the beginning of the Private Endpoint

```
                    Change ICC AWS S3 Resource (CHGS3RICC)

 Type choices, press Enter.

 Resource URI . . . . . . . . . . .   'https://s3.private.us-east.cloud-object-sto
rage.appdomain.cloud'
                                                                              ...
```

- Resource name: Can be anything you want
- Resource description: Make it something meaningful
- Access key id: Copy this from your Cloud Object Storage Resource
    a. Click on Service credentials

b. Click on the pull down associated with your Key name

c. Look for “cos-hmac-keys”:

d. Copy the “access_key_id” without the quotes

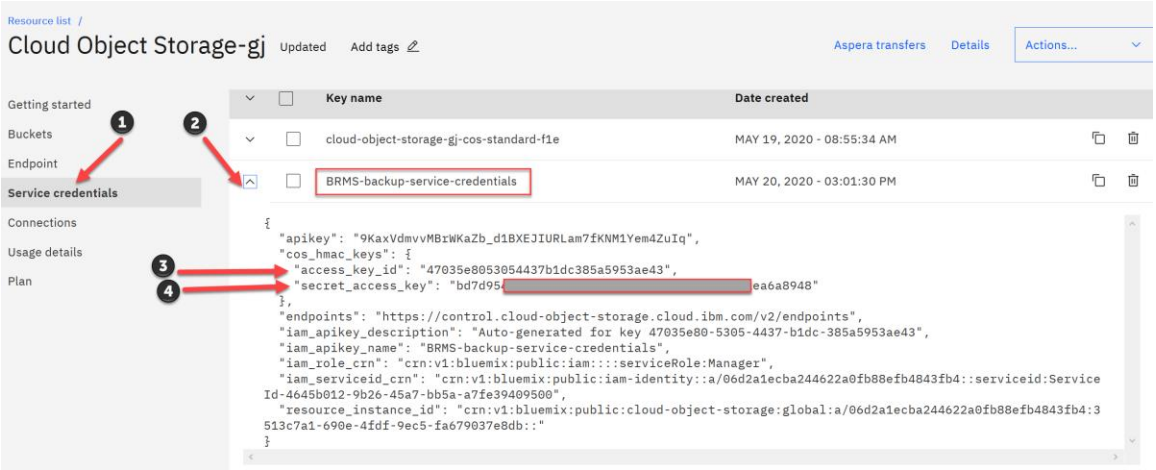
- Secret access key: Copy this from your Cloud Object Storage Resource:

  a. Click on Service credentials

  b. Click on the pull down associated with your Key name

  c. Look for “cos-hmac-keys”:

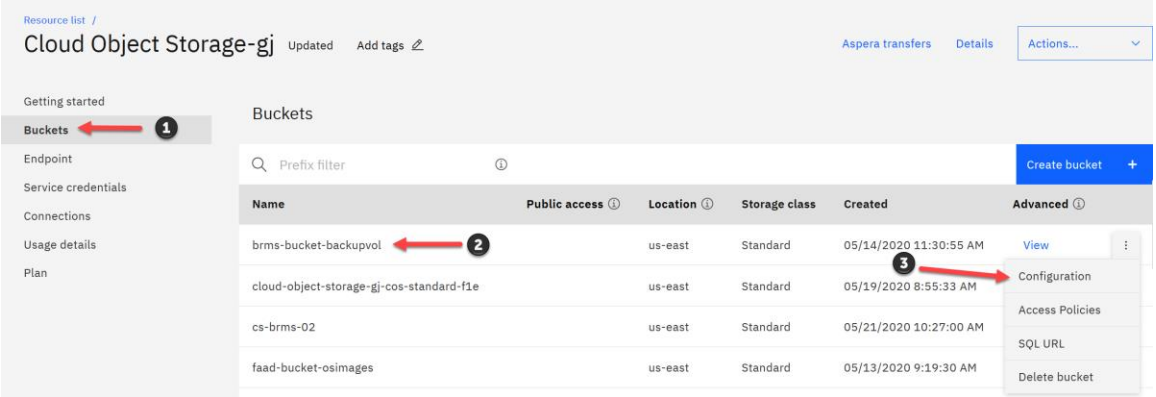
  d. Copy the “secret_access_key” without the quotes



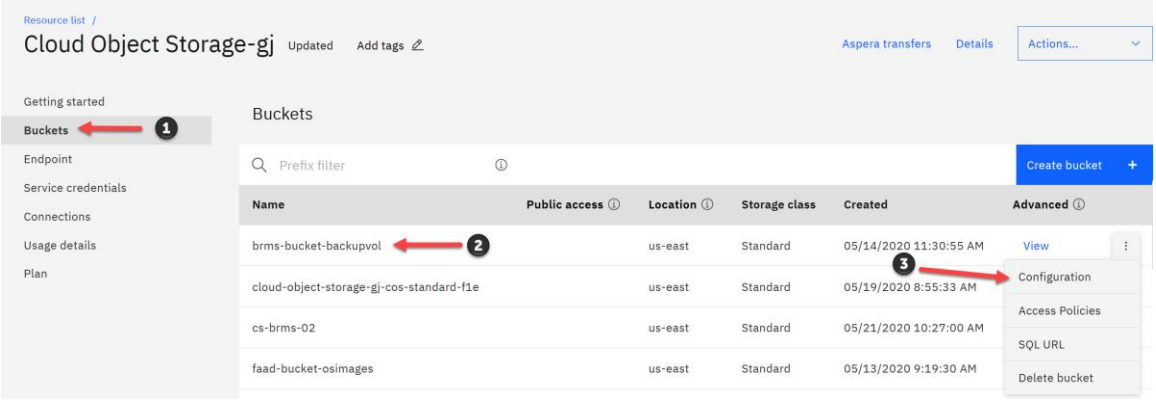
- Bucket: Copy this from your Cloud Object Storage Resource

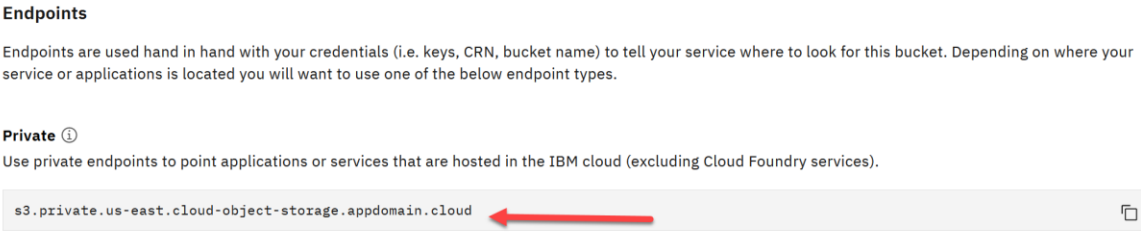
  a. Click on Buckets

  b. Find your Bucket name



- Resource URI: Copy this from your Cloud Object Storage Resource
    a. Click on Buckets
    b. Find your Bucket name
    c. Click on the three dots and select Configuration
    d. Select the Endpoint for your network connection





NOTES:

Depending on where your service or applications is located you will want to use one of the three endpoint types.

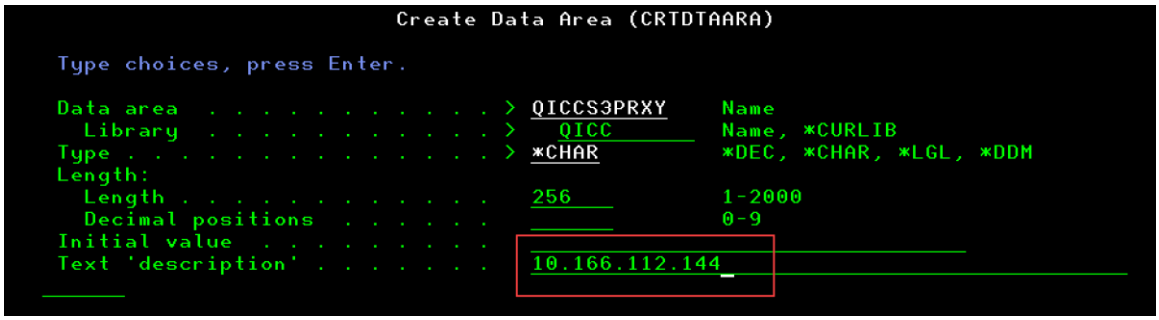
***Private** - Whenever possible use a private endpoint.*

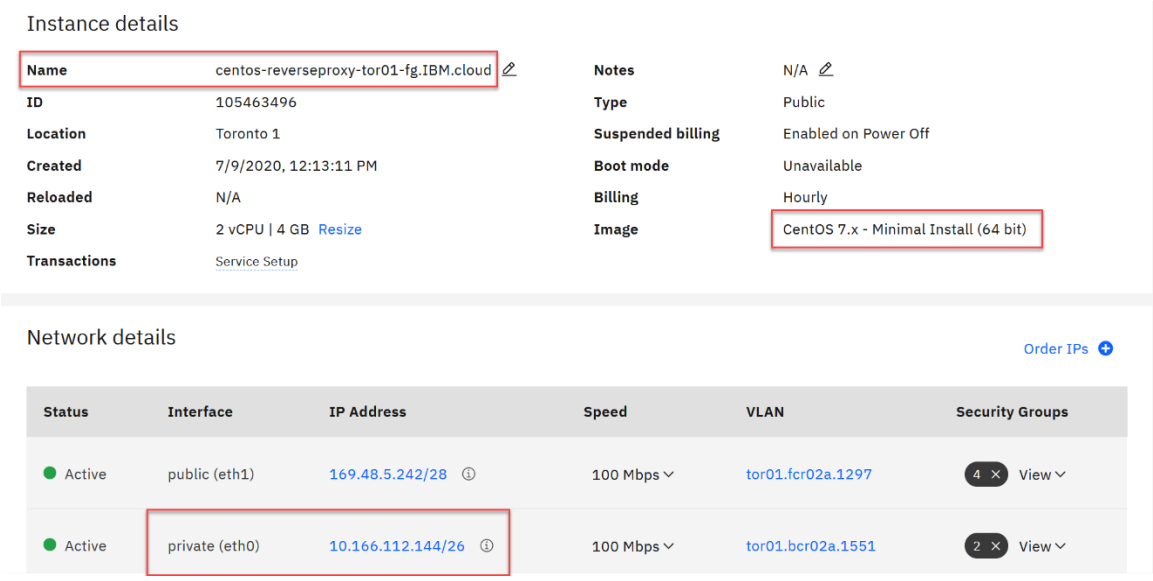
***Public** - Public endpoints can accept requests from anywhere and charges are assessed on outgoing bandwidth.*

***Direct** - Direct endpoints can accept requests from within the VPC and charges are assessed on outgoing bandwidth.*

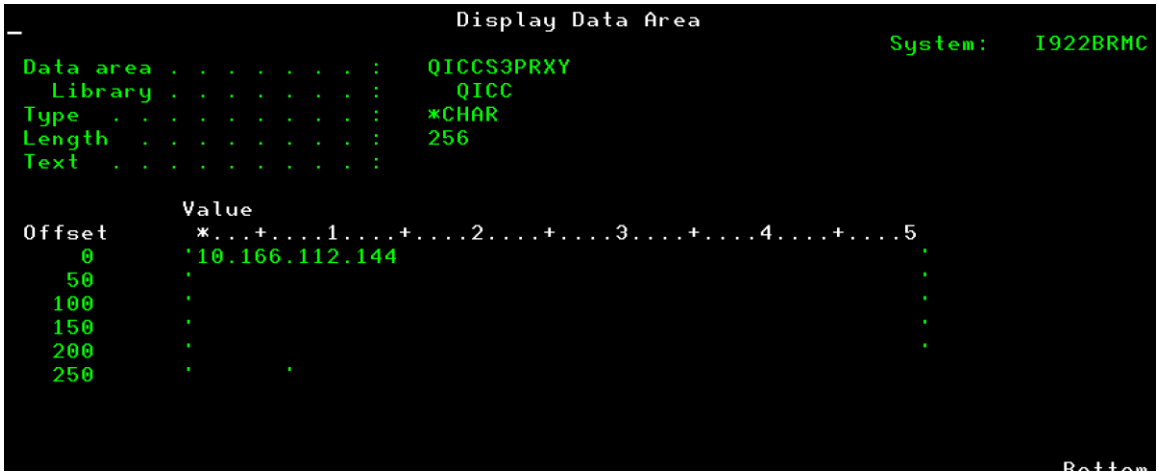
In our scenario, we are using the Public endpoint. Best practice recommends to use Private or Direct endpoints and NOT Public.

2. Load and Apply PTF Direct Link (DL) Reverse Proxy Server Support. Support Google Cloud Storage.
    - SI73401 - Cloud Storage Solutions Proxy Support
    - Run any special instruction on the cover letter
3. Create Data Area QICCS3PRXY in library QICC
    - CRTDTAARA DTAARA(QICC/QICCS3PRXY) TYPE(*CHAR) LEN(256) TEXT('10.166.112.144')
    - Text 'description' = Private IP address of the Reveres Proxy Server created in the cloud.





4. Display the Data Area QICC/QICCS3PRXY
    - Verify the IP address



5. Configure SSL Encryption for the IBM Cloud Storage Solutions Application
    1) Create a *SYSTEM certificate keystore
        a. Log into IBM Navigator for i as a user with authority to use the DigitalCertificate Manager.

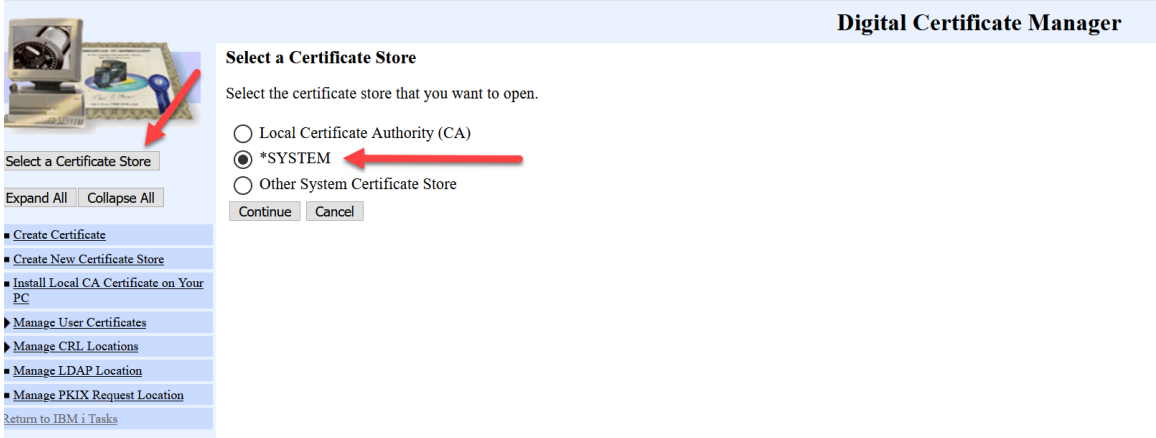
http://localhost:2001/QIBM/ICSS/Cert/Admin/qycucm1.ndm/main0

        b. In the navigation pane, click Internet Configurations.
        c. Click Digital Certificate Manager.

d. Click Create New Certificate Store.
e. Select *SYSTEM, and then click Continue.

Note: If the only option is Other System Certificate Store, a *SYSTEM certificate store already exists. Click Cancel and proceed to Step 2.

In this Example, we had already created a Certificate Store for 5250 SSL connections.



f. Select No - Do not create a certificate in the certificate store.
g. Enter a password for the certificate keystore, enter it again to confirm it, and then click Continue.
h. Click OK. Do not log out.

2) Copy and Download the certificate authorities from the resource URI location (Reverse-Proxy Server). For example, using Microsoft Windows take the following steps:
   a. Have the Reverse-Proxy Server Admin send you the generated ssl self-signed keys you created in the previous steps. You only need the *.crt text file.
   b. Have the admin open the *.crt text file, copy and paste the text in a note, and then send to you.
   c. On you Windows desktop create a text file for your new *.crt.
   d. Open the text file, copy and paste the ssl self-signed certificate information.

e. Save and rename the new text file with a ".crt" extension.

Example: labser.crt

Name	Date modified	Type	Size
labser.crt	7/22/2020 2:16 PM	Security Certificate	2 KB

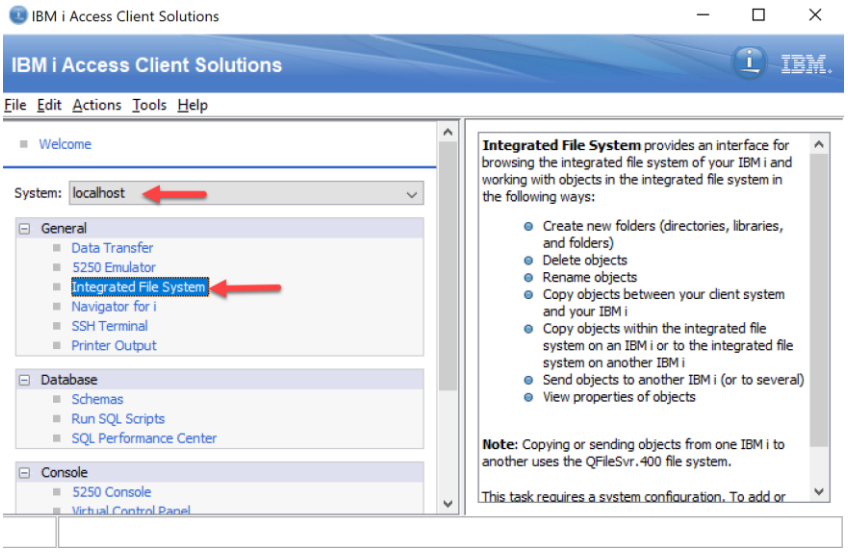
3) Upload xxxx.crt text file to IBM i directory:

a. Connect to the IBM i using IBM I Access Client Solutions.

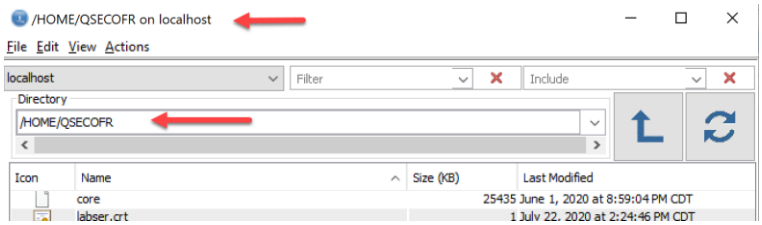
b. Select your IBM i system name or ip address.

c. Select your System (localhost was created using PuTTY)

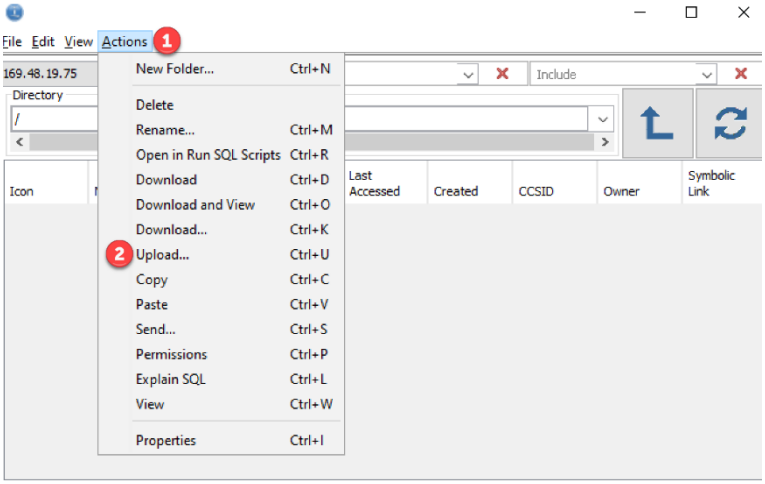
d. Select "Integrated File System".



e. It will open in your HOME/<USER Profile> directory you signed on with.

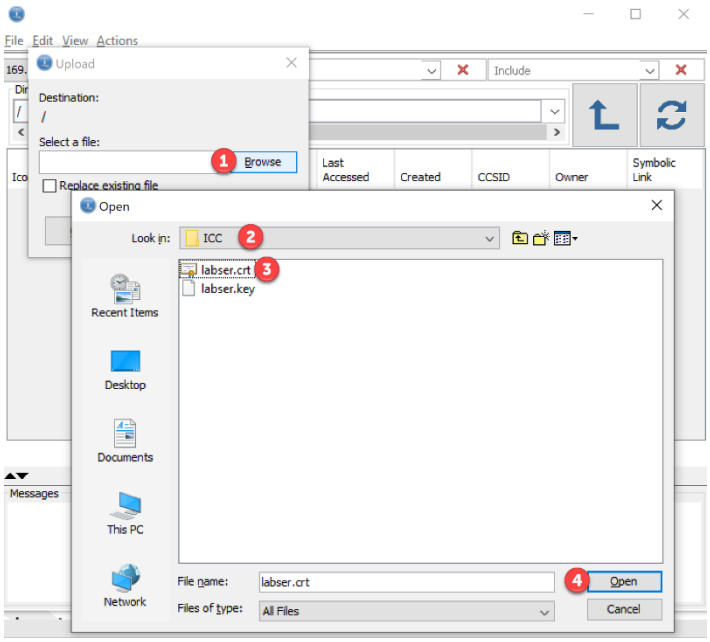


f. Select “Actions” then “Upload”.



g. Select “Browse” to locate the directory and .crt file on your PC.

h. Click open.



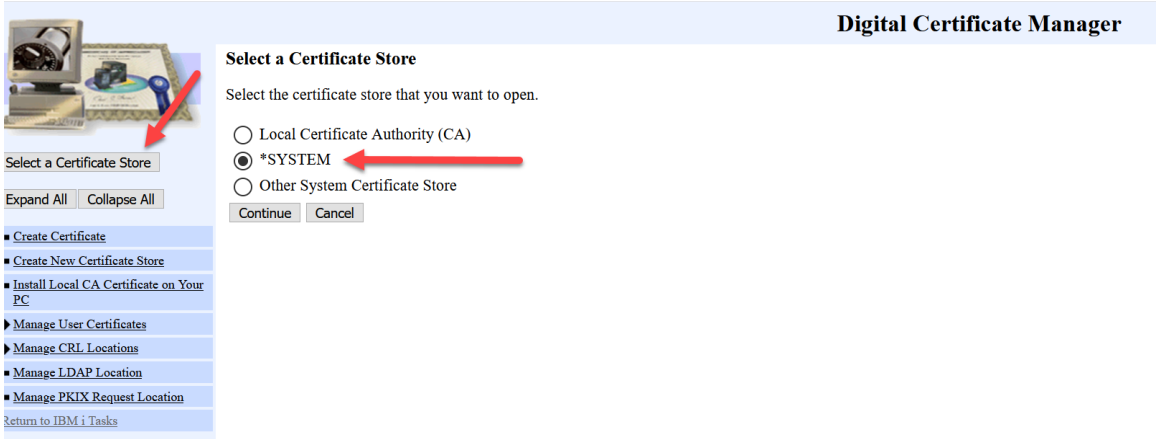
i. Select OK.

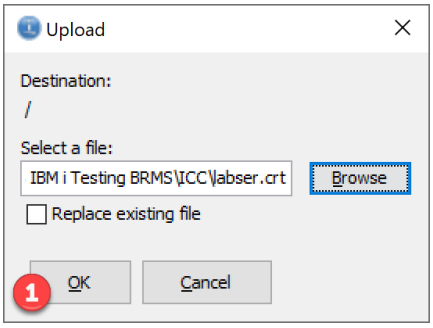
4) Import the certificate into the *SYSTEM keystore:

a. *In IBM Navigator for i, open the Digital Certificate Manager.*

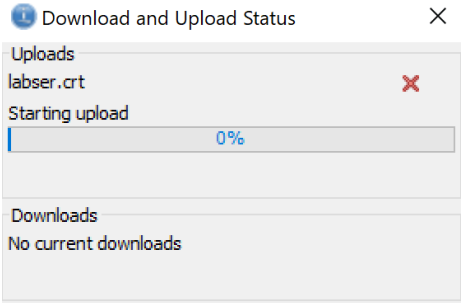
b. *In the navigation pane, click Select a Certificate Store.*

c. *Select *SYSTEM, and then click Continue.*



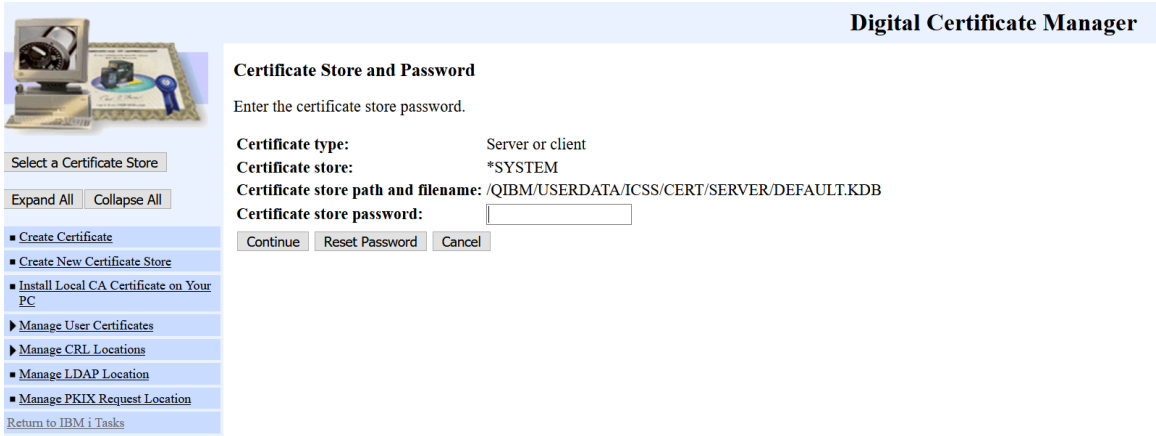


d. In the Certificate store password field, enter the *SYSTEM



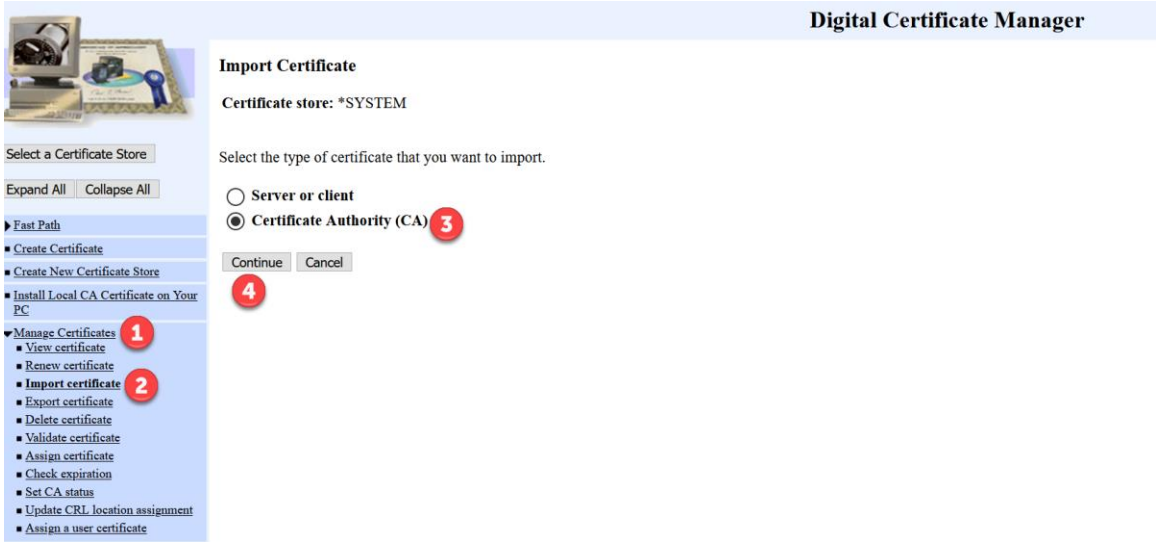
keystore password you created in Step 1, and then click

Continue. The navigation pane displays tasks that you can perform with the *SYSTEM keystore.



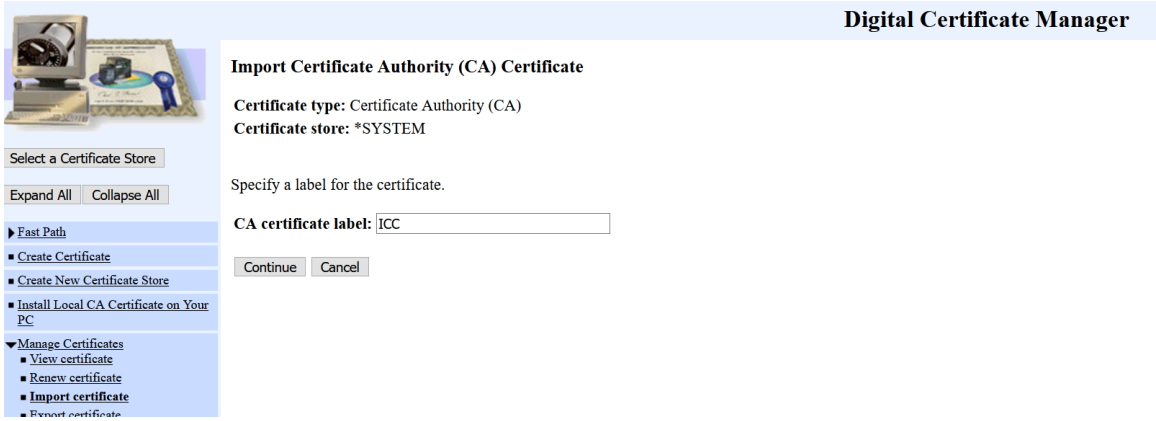
e. In the navigation pane, click Manage Certificates> Import certificate.

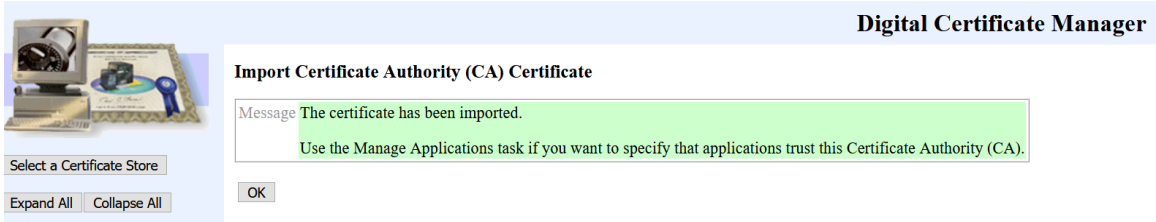
f. Select Certificate Authority (CA)as the type of certificate to import, and then click Continue.



g. Enter the path and file name of the certificate file that you copied to the IBM i computer in Step 2, and then click Continue.

h. Enter a label for the certificate, and then click Continue. The certificate is imported into the *SYSTEM keystore. Click OK. Do not log out of the Digital Certificate Manager.

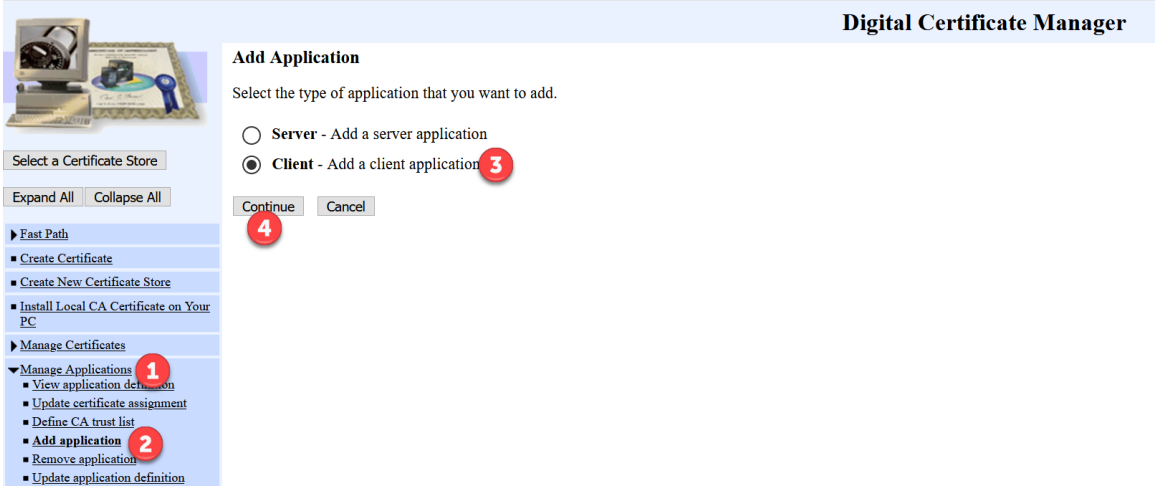




5) Add Cloud Storage Solutions to the list of client applications:

a. In the Digital Certificate Manager navigation pane, click Manage Applications> Add applications.

b. Select Client, and then click Continue.



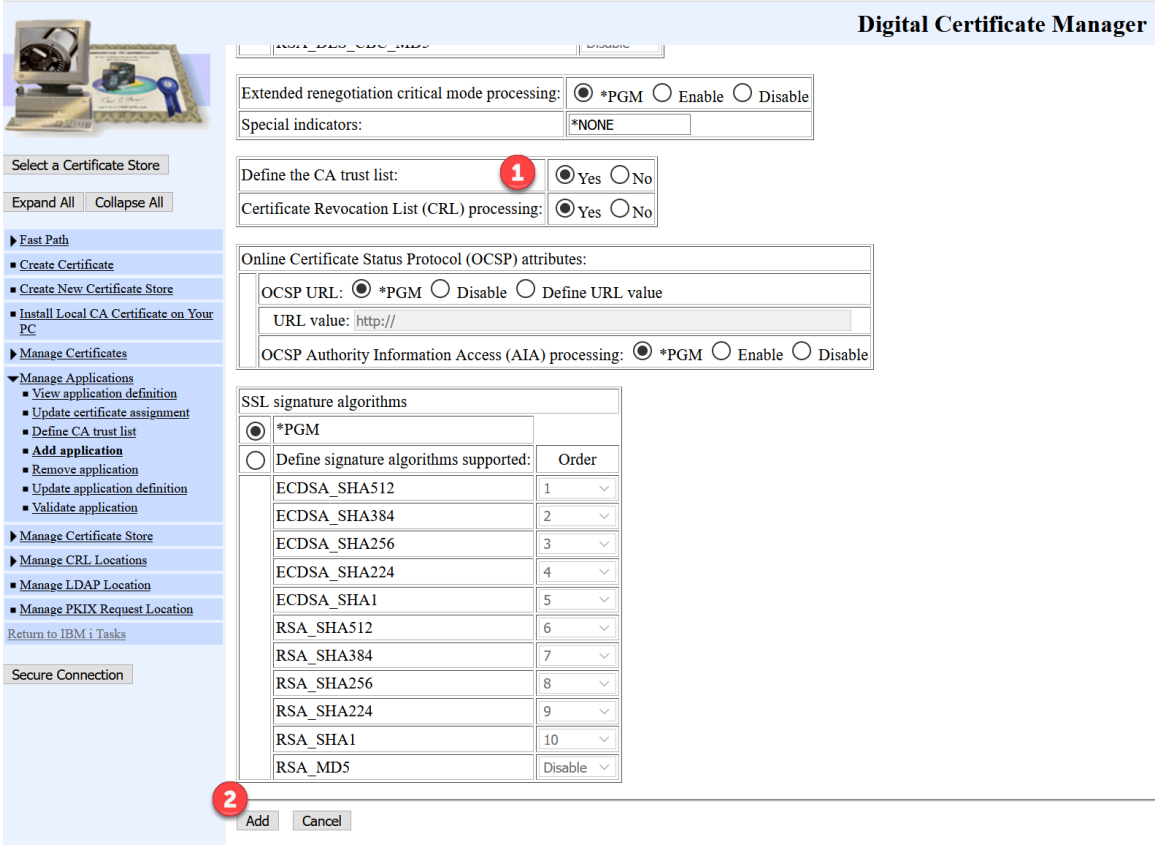
c. In the Add application page, in the Application ID field, type **`IBM_QICC`**.

d. Select Application description and in the field type **`IBM Cloud Storage Solutions for i`**.

e. In the Define the CA trust list field, select Yes.

f. Select any SSL values that match your enterprise policies, such as the SSL protocol, SSL cipher, or SSL signature algorithm. (I took the defaults *PGM)

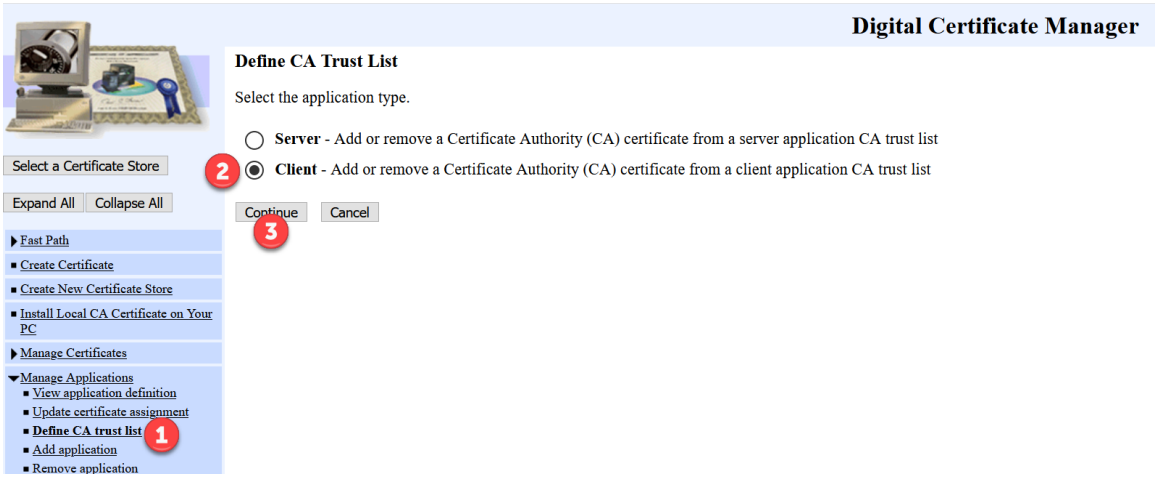
g. Click Add, then click OK.



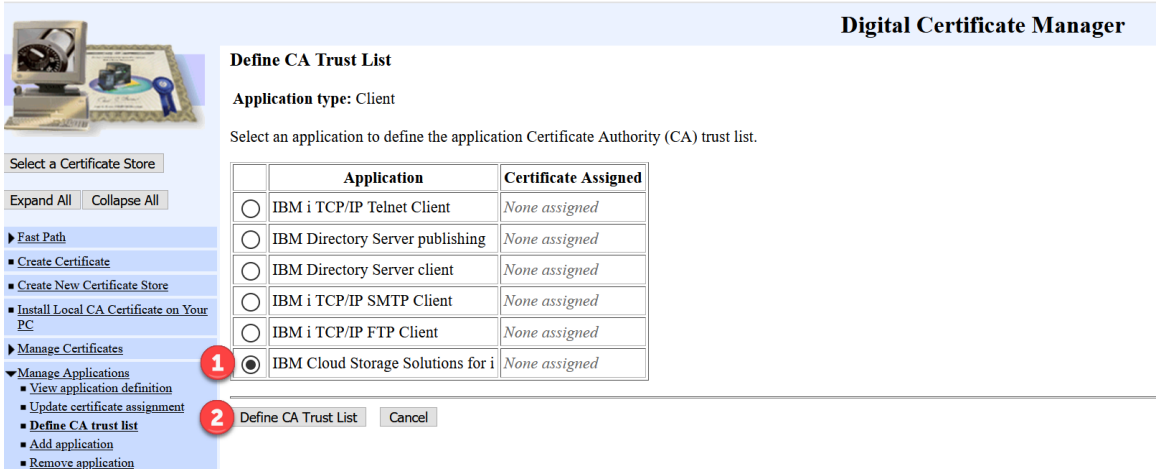
6) Add the certificate authorities to the Cloud Storage Solutions trust list:

   a. In the Digital Certificate Manager navigation pane, click Manage Applications> Define CA trust list.

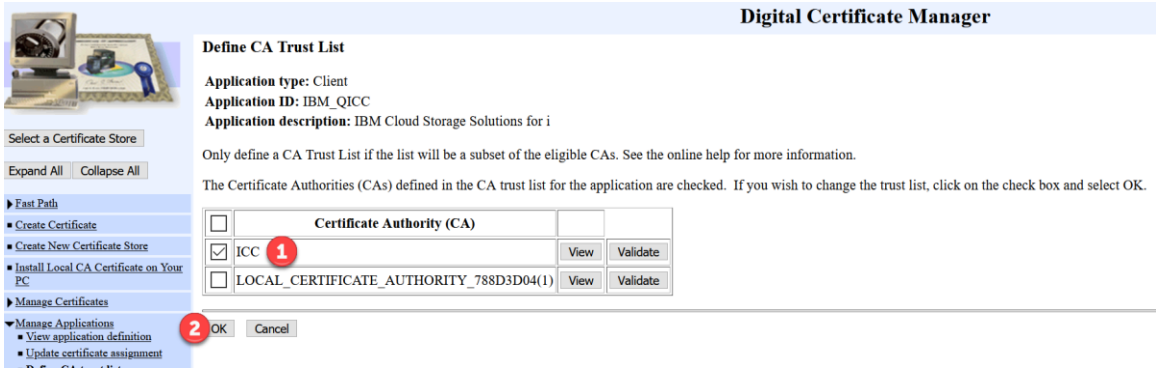
   b. Select Client, and then click Continue.



c. Select IBM Cloud Storage Solutions for i, and then click Define CA Trust List.



d. Select all of the certificate authorities that you imported in Step 3, and then click OK.



Create Cloud Resource – using a Public Endpoint

Note: Skip this step if you are already using a Private Endpoint.

Jump to:

Full-System Backups from the Cloud

OR

Object-level Backups

This Example show how to use a **Public** - Public Endpoint if you don't have a Private Endpoint.

2) Create a cloud resource by running the following command:

2) **CRTS3RICC**

```
Type choices, press Enter.

Resource name  . . . . . . . . . . > TOR1CLD      Name
Resource description . . . . . . . > 'Cloud Object Storage Toronto 01'

Access key id  . . . . . . . . . . > 47035e8053054437b1dc385a5953ae43

Secret access key  . . . . . . .

Use compression  . . . . . . . .   *NO           *NO, *YES
Use encryption . . . . . . . . .   *NO           *NO, *YES
Bucket . . . . . . . . . . . . . > 'brms-bucket-backupvol'
```

```
                    Change ICC AWS S3 Resource (CHGS3RICC)

  Type choices, press Enter.

  Resource URI . . . . . . . . . .   's3.us-east.cloud-object-storage.appdomain.c
 loud'
                                                                            ...
```

3) Resource name: Can be anything you want

4) Resource description: Make it something meaningful

5) Access key id: Copy this from your Cloud Object Storage Resource

   a. Click on Service credentials

   b. Click on the pull down associated with your Key name

   c. Look for “cos-hmac-keys”:

   d. Copy the “access_key_id” without the quotes

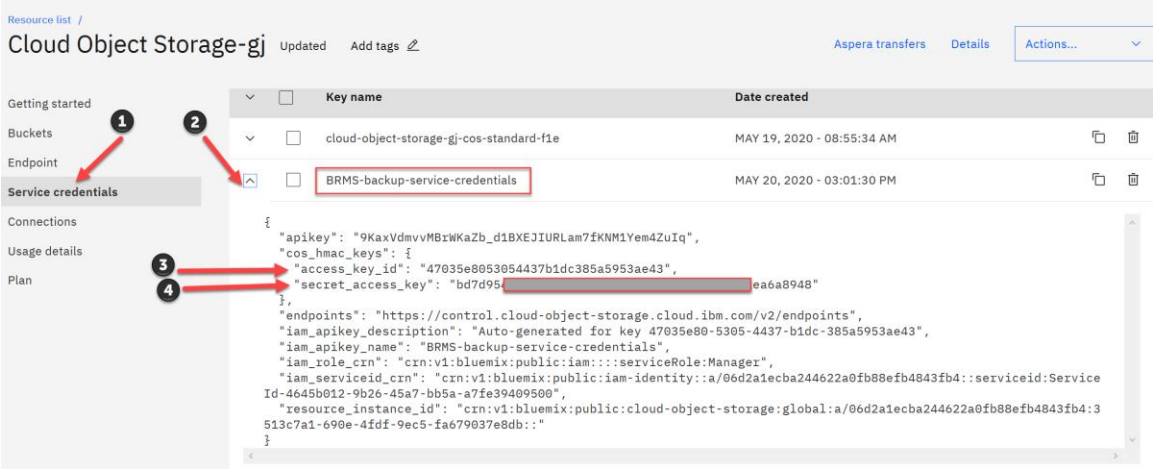
6) Secret access key: Copy this from your Cloud Object Storage Resource:

a. Click on Service credentials

b. Click on the pull down associated with your Key name

c. Look for “cos-hmac-keys”:

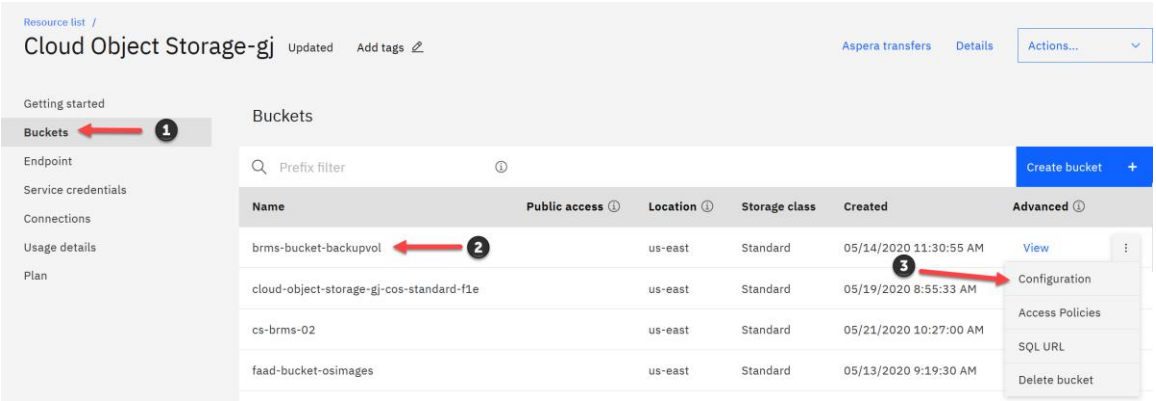
d. Copy the “secret_access_key” without the quotes



7) Bucket: Copy this from your Cloud Object Storage Resource

a. Click on Buckets

b. Find your Bucket name



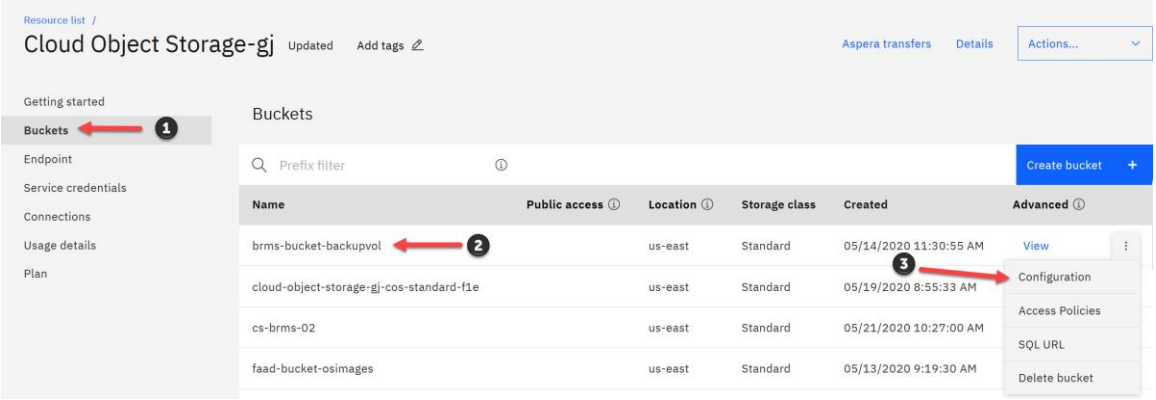
8) Resource URI: Copy this from your Cloud Object Storage Resource

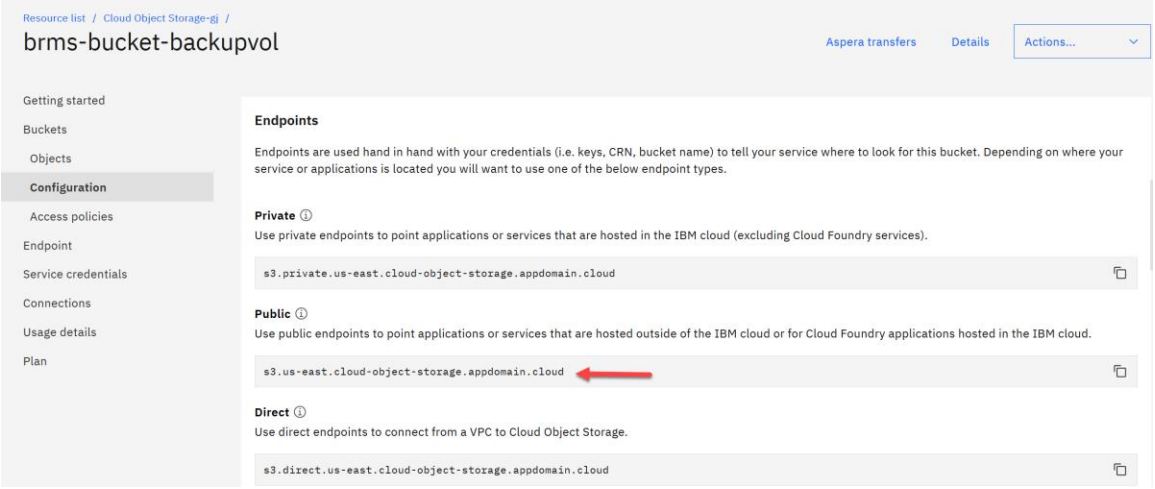
a. Click on Buckets

b. Find your Bucket name

c. Click on the three dots and select Configuration

d. Select the Endpoint for your network connection





NOTES:

Depending on where your service or applications is located you will want to use one of the three endpoint types.

***Private** - Whenever possible use a private endpoint.*

***Public** - Public endpoints can accept requests from anywhere and charges are assessed on outgoing bandwidth.*

Direct *- Direct endpoints can accept requests from within the VPC and charges are assessed on outgoing bandwidth.*

In our scenario, we are using the Public endpoint. Best practice recommends to use Private or Direct endpoints and NOT Public.

Full-System Backups from the Cloud

The following save data must be restored from physical media before BRMS can begin restoring save data directly from the cloud:

- **SAVSYS** is required to install the operating system
- product **IBM Backup, Recovery and Media Services for i** and BRMS save information is required before automatic recovery can be performed
- product **IBM TCP/IP Connectivity for i** and configuration information is required to allow communications with cloud storage providers
- product **IBM Cloud Storage Solutions for i** and configuration information is required to establish connections with cloud storage providers

BRMS provides specific control groups that can be used to automatically save this data to media in the cloud and the cloud media can be used to create physical media. The control groups will create cloud media that is formatted so it can be downloaded and burned directly to physical optical media. All remaining data on the system can be backed up to media in the cloud and restored directly from the cloud without a need to create physical media.

Control group QCLDBIPLnn can be used to do full backups of all data that must be recovered from physical media. Likewise, QCLDBGRPnn can be used to do cumulative incremental saves of the data that must be recovered from physical media.

NOTE: The Journaled objects control group field must be changed to *YES for a QCLDBGRPnn control group before the control group is used to do an incremental backup. Run the WRKCTLGBRM command and change the Journaled objects field by specifying option 8=Change attributes for QCLDBGRPnn.

Control group QCLDBSYSnn can be used to do a full backup of the data which can be restored directly from the cloud. Likewise, control group QCLDBUSRnn can be used to do cumulative incremental backups of the data which can be restored directly from the cloud.

NOTE: The Journaled objects control group field must be changed to *YES for a QCLDBUSRnn control group before the control group is used to do an incremental backup. Run the WRKCTLGBRM command and change the Journaled objects field by specifying option 8=Change attributes for QCLDBUSRnn.

It is **critical** to run the cloud control groups in the correct order **otherwise** all necessary media information will not be available to do a recovery. The control groups that produce media that will be burned to optical must be run after the control groups that produce media that can be recovered directly from the cloud. For example:

First run BRMS Control Group QCLDBSYS01:

STRBKUBRM CTLGRP(QCLDBSYS01) SBMJOB(*NO)

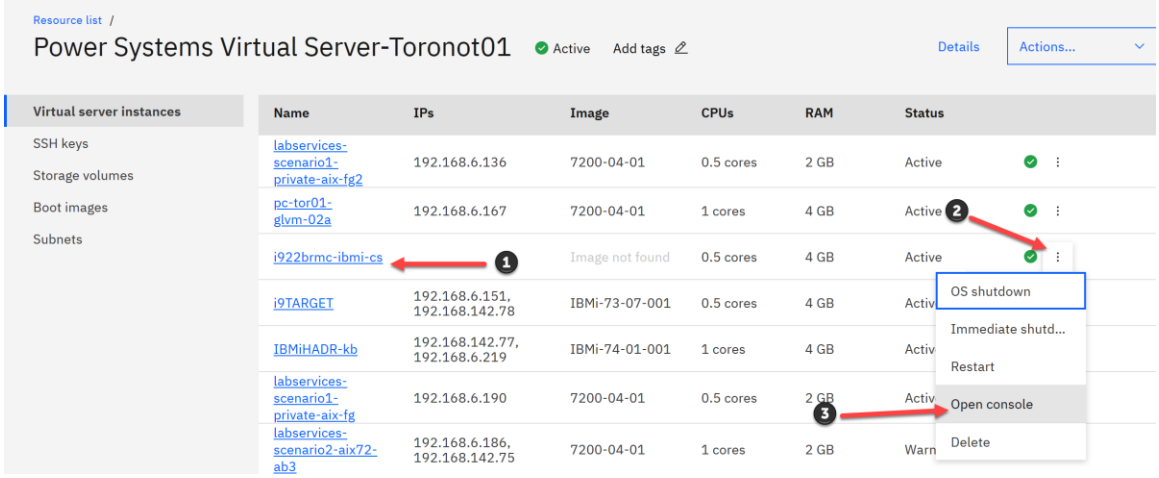
Second run BRMS Control Group QCLDBIPL01:

STRBKUBRM CTLGRP(QCLDBIPL01) SBMJOB(*NO)

This example will show you how to run the Full-System Backups from the Console.

1. Log in to the IBM Cloud with your IBMid and Password:
    - Select your Service (Example shows Toronto 01)

    - Select your Virtual server instance:
        1) Find your server name “i922brmc-ibmi-cs”
        2) Click the three dots on the right
        3) Select Open console

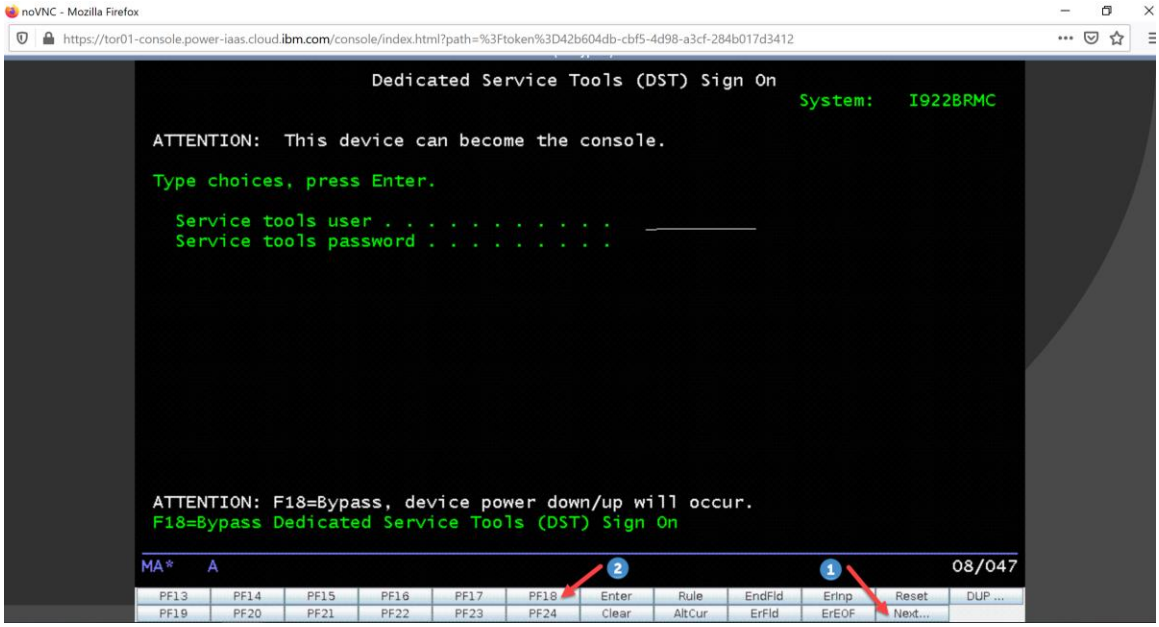


2. Sign On using your Dedicated Service Tools (DST) User and password.

   - *OR* -

   Select PF18 to Bypass,

   1) Select Next
   2) Press PF18



NOTES:

- The Console will timeout if inactive after 5 minutes. You may have to end your Console browser and start a new Console connection.

- If you see a Break Message during the Backup, press Enter once to bring you back to the screen where you entered the STRBKUBRM command so you can see the progress of the backup.

```
                                Display Messages
                                                          System:   I922BRMC
Queue . . . . . :   QSYSOPR                  Program . . . . :   *DSPMSG
  Library . . . :     QSYS                     Library . . . :
Severity  . . . :   60                       Delivery  . . . :   *BREAK

Type reply (if required), press Enter.
_  ENDSBS SBS(*ALL) command being processed.
   System ended to restricted condition.
```

3. **First** run the BRMS Control Group **QCLDBSYS01**
    - Put the system in restricted state
        1. ENDSBS SBS(*ALL) DELAY(120)

```
                            End Subsystem (ENDSBS)

Type choices, press Enter.

Subsystem  . . . . . . . . . . . . *ALL        Name, *ALL
How to end . . . . . . . . . . . . *CNTRLD     *CNTRLD, *IMMED
Controlled end delay time  . . . . 120         Seconds, *NOLIMIT
End subsystem option . . . . . . . *DFT        *DFT, *NOJOBLOG, *CHGPTY...
                + for more values
```

4. Display QSYSOPR MSGQ, type command **DSPMSG QSECOFR** and look for the following messages:

    - System ended to restricted condition.

    - A request to end TCP/IP has completed.

```
                                Display Messages
                                                          System:   I922BRMC
 Queue . . . . . :   QSYSOPR                  Program . . . . :   *DSPMSG
   Library . . . :     QSYS                     Library . . . :
 Severity  . . . :   60                       Delivery  . . . :   *BREAK

 Type reply (if required), press Enter.
 _  Subsystem QSERVER ended.
    Subsystem QSYSWRK ended.
    Subsystem QINTER ended.
    System ended to restricted condition.
    TCP/IP is ending.
    IPv6 interface ended successfully.
    IPv6 interface ended successfully.
    User QSYS in job 224877/QSYS/QTCPWRK ended TCP/IP *LOOPBACK interface
      127.0.0.1.
    User QSYS ended IP interface 192.168.142.76 on CLOUDINIT2.
    User QSYS ended IP interface 192.168.6.117 on CLOUDINIT1.
    A request to end TCP/IP has completed.
    TCP/IP is ending.
```

5. Change subsystems to process for Control Group QCLDBSYS01
    - Use the **WRKCTLGBRM** command
    - Find QCLDBSYS01
    - Select Option 9=Subsystems to process
    - Change Restart to *NO for Seq 10 Subsystem *ALL

```
                        Work with Backup Control Groups              I922BRMC

 Position to . . . . . .  __________   Starting characters

 Type options, press Enter
   1=Create    2=Edit entries    3=Copy      4=Delete   5=Display
   6=Add to schedule   8=Change attributes   9=Subsystems to process ...
                 Full       Incr       Weekly
     Control     Media      Media      Activity
 Opt Group       Policy     Policy     SMTWTFS  Text

 __  __________
 __  *BKUGRP     *BKUPCY    *BKUPCY    *BKUPCY  Backs up all user data
 __  *SYSGRP     SAVSYS     SAVSYS     *BKUPCY  Backs up all system data
 __  *SYSTEM     SYSTEM     SYSTEM     *BKUPCY  Backs up the entire system
 __  QCLDBGRP01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
     QCLDBIPL01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
 9_  QCLDBSYS01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
 __  QCLDBUSR01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
```

```
                          Subsystems to Process                    I922BRMC

Use . . . . . . . . . . :   *BKU
Control group . . . . . :   QCLDBSYS01


Type choices, press Enter.
                                          End
  Seq     Subsystem      Library          Option      Delay        Restart
  10      *ALL           *ALL             *CNTRLD     120          *NO
```

6. Run the First backup from the console

   STRBKUBRM CTLGRP(QCLDBSYS01) SBMJOB(*NO)

7. Check the backup for errors. Its normal to have some errors:

   - Objects not saved. (Some objects are not required for the recovery).
   - Media not transferred. (You will complete this step manually after the Second backup).

```
                              Display All Messages
                                                          System:   I922BRMC
Job . . :   DSP01          User . . :   QSECOFR       Number . . . :   224880

    234282 blocks processed for sequence 160, volume Q31632, on device
      Q1AVTAP001.
    52 objects not saved.
    185919 objects saved. 1 not saved.
    Save of list *LINK completed with errors.
    Control group QCLDBSYS01 bypassed automatic save of media information.
    The protocol required to support the specified address family is not
      available at this time.
    Open server connection failed.
    Calling exit program Q1ACLDEXIT in library QBRM.
    An Error occurred. Check the previous messages in the joblog.
    COPY FILE TO CLOUD FAILED
    MEDIA Q31632 NOT TRANSFERRED TO CLOUD TOR1CLD.
    Control group QCLDBSYS01 type *BKU completed with errors.
                                                                        Bottom
Press Enter to continue.
```

8. Check subsystems after the backup completes. You should only have subsystem QCTL in a status of RSTD. If not, end all subsystems again.

   - ENDSBS SBS(*ALL) DELAY(120)

```
                              Work with Subsystems
                                                                   System:   I922BRMC
Type options, press Enter.
  4=End subsystem   5=Display subsystem description
  8=Work with subsystem jobs

                        Total      Subsystem  Active
Opt  Subsystem      Storage (M)    Number     Jobs    Status
 _   QCTL                .00       224882        1    RSTD
```

9. Change BRMS Control Group QCLDBIPL01
    - Use the **WRKCTLGBRM** command
    - Select Option 8=Change attributes
    - Page down once, change Automatically backup media information to *LIB, also Append to media to *NO.
    - Select Option 9=Subsystems to process
    - Change Restart to *YES for Seq 10 Subsystem *ALL

```
                        Work with Backup Control Groups              I922BRMC

Position to . . . . . .  __________   Starting characters

Type options, press Enter
  1=Create    2=Edit entries    3=Copy      4=Delete   5=Display
  6=Add to schedule   8=Change attributes   9=Subsystems to process ...
                Full        Incr        Weekly
    Control     Media       Media       Activity
Opt Group       Policy      Policy      SMTWTFS   Text
__  __________
__  *BKUGRP     *BKUPCY     *BKUPCY     *BKUPCY   Backs up all user data
__  *SYSGRP     SAVSYS      SAVSYS      *BKUPCY   Backs up all system data
__  *SYSTEM     SYSTEM      SYSTEM      *BKUPCY   Backs up the entire system
    QCLDBGRP01  TOR1CLD     TOR1CLD     *BKUPCY   Entry created by BRM configura
8_  QCLDBIPL01  TOR1CLD     TOR1CLD     *BKUPCY   Entry created by BRM configura
__  QCLDBSYS01  TOR1CLD     TOR1CLD     *BKUPCY   Entry created by BRM configura
```

```
                    Change Backup Control Group Attributes

Group  . . . . . . . . . . . . . . . . . . : QCLDBIPL01

Type information, press Enter.

Automatically backup
    media information  . . . . . . . . . . *LIB        *LIB, *OBJ, *NONE, *BKUPCY
Save access paths  . . . . . . . . . . . . *BKUPCY     *YES, *NO, *BKUPCY ...
Save contents of save files  . . . . . . . *BKUPCY     *YES, *NO, *BKUPCY
Save spooled file data . . . . . . . . . . *BKUPCY     *NONE, *ALL, *BKUPCY
Queue data . . . . . . . . . . . . . . . . *BKUPCY     *NONE, *DTAQ, *BKUPCY
Data compression . . . . . . . . . . . . . *BKUPCY     *DEV, *YES, *NO, *BKUPCY
Data compaction  . . . . . . . . . . . . . *BKUPCY     *DEV, *NO, *BKUPCY
Target release . . . . . . . . . . . . . . *BKUPCY     *CURRENT, *PRV, *BKUPCY
Update history . . . . . . . . . . . . . . *BKUPCY     *YES, *NO, *BKUPCY
Update history for directories . . . . . . *BKUPCY     *SYS, *NO, *PC, *YES ...

Clear  . . . . . . . . . . . . . . . . . . *BKUPCY     *NONE, *ALL...
Object pre-check . . . . . . . . . . . . . *BKUPCY     *YES, *NO, *BKUPCY
Append to media  . . . . . . . . . . . . . *NO         *YES, *NO, *BKUPCY
                                                                        More...
```

```
                    Work with Backup Control Groups                I922BRMC

Position to . . . . . . __________   Starting characters

Type options, press Enter
  1=Create    2=Edit entries    3=Copy      4=Delete    5=Display
  6=Add to schedule   8=Change attributes   9=Subsystems to process ...
                Full       Incr       Weekly
    Control     Media      Media      Activity
Opt Group       Policy     Policy     SMTWTFS  Text

__  __________
__  *BKUGRP     *BKUPCY    *BKUPCY    *BKUPCY  Backs up all user data
__  *SYSGRP     SAVSYS     SAVSYS     *BKUPCY  Backs up all system data
__  *SYSTEM     SYSTEM     SYSTEM     *BKUPCY  Backs up the entire system
__  QCLDBGRP01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
9_  QCLDBIPL01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
__  QCLDBSYS01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
```

```
                         Subsystems to Process                     I922BRMC

Use . . . . . . . . . . :  *BKU
Control group . . . . :  QCLDBIPL01


Type choices, press Enter.
                                        End
  Seq     Subsystem     Library         Option     Delay      Restart

  10      *ALL          *ALL            *CNTRLD    120        *YES
```

10. Run the Second backup from the console

STRBKUBRM CTLGRP(QCLDBIPL01) SBMJOB(*NO)

11. Check the backup for errors. It's normal to have some errors:
    - Objects not saved. (Some objects are not required for the recovery).
    - Media not transferred. (Will complete this manually after the Second backup).
12. Now you will Identify the Volumes used the BOTH backups QCLDBSYS01 and QCLDBIPL001 and transfer to IBM Cloud Object Storage (COS).
13. Check the status of the transfer.
    - Run command WRKSTSICC STATUS(*ALL)
    - If the Status in Failed, this is normal. We will transfer the volumes in the next step.

```
                                Work with ICC Status                        I922BRMC

Type options, press Enter.
   4=End

                        --------- Job --------------                        Graphic% /
Opt File name/Time  Name       User       Number Status      Oper     Complete%
_   /IASP33/cloud/Q1ACQ15277/Q15277
     07/06/20 09:27 DSP01      QSECOFR    224880 Failed      TOCLD            0
__  /IASP33/cloud/Q1ACQ31632/Q31632
     07/06/20 09:27 DSP01      QSECOFR    224880 Failed      TOCLD            0
__  /IASP33/cloud/Q1ACQ06990/Q08807
     07/06/20 10:37 L000000204 QSECOFR    271013 Failed      TOCLD            0
__  /IASP33/cloud/Q1ACQ06990/Q07898
     07/06/20 10:37 L000000205 QSECOFR    271033 Failed      TOCLD            0
__  /IASP33/cloud/Q1ACQ06990/Q06990
     07/06/20 10:37 L000000206 QSECOFR    271036 Failed      TOCLD            0
                                                                          Bottom
```

14. Identify which Volumes were used for the backups:
    - **WRKMEDBRM TYPE(*TRF)**

```
                                Work With Media
                                                          System:   I922BRMC
Position to  . . . . .  ______        Starting characters

Type options, press Enter.
  1=Add    2=Change    4=Remove    5=Display    6=Work with serial set    7=Expire
  8=Move    9=Remove volume error status      10=Reinitialize ...

     Volume                Creation Expiration                Move      Media       Dup
Opt  Serial      Status      Date      Date     Location      Date      Class       Sts
_    ______
__   Q06990 +    *TRF     07/06/20  07/27/20  TOR1CLD     07/06/20 QCLDVRTOPT
__   Q07898 +    *TRF     07/06/20  07/27/20  TOR1CLD     07/06/20 QCLDVRTOPT
__   Q08807 +    *TRF     07/06/20  07/27/20  TOR1CLD     07/06/20 QCLDVRTOPT
__   Q13692 +    *TRF     07/06/20  07/27/20  TOR1CLD     07/06/20 QCLDVRTTAP
__   Q15277 +    *TRF     07/06/20  07/27/20  TOR1CLD     07/06/20 QCLDVRTTAP
__   Q31632 +    *TRF     07/06/20  07/27/20  TOR1CLD     07/06/20 QCLDVRTTAP
__   Q32656 +    *TRF     07/06/20  07/27/20  TOR1CLD     07/06/20 QCLDVRTTAP
                                                                          Bottom
```

15. Transfer the Volumes to IBM Cloud Object Storage (COS)
    - Run command **STRMNTBRM**
    - Run command WRKSTSICC STATUS(*ALL)
    - You will see the Volume Name, Status, and Complete% for each file transfer. Wait until all Volumes have Successfully been completed to proceed to the next step.

```
                              Work with ICC Status                      I922BRMC

Type options, press Enter.
   4=End

                        --------- Job --------------                      Graphic% /
Opt File name/Time   Name        User        Number Status      Oper      Complete%
_  /IASP33/cloud/Q1ACQ15277/Q15277                                         ***4
    07/06/20 11:10 L000000209 QSECOFR     271359 Active      TOCLD            34
__ /IASP33/cloud/Q1ACQ31632/Q31632                                         ***8
    07/06/20 11:10 L000000210 QSECOFR     271360 Active      TOCLD            38
__ /IASP33/cloud/Q1ACQ06990/Q06990                                         *********
    07/06/20 11:10 L000000211 QSECOFR     271361 Active      TOCLD            90
__ /IASP33/cloud/Q1ACQ06990/Q07898                                         *********2
    07/06/20 11:10 L000000212 QSECOFR     271362 Active      TOCLD            92
__ /IASP33/cloud/Q1ACQ06990/Q08807                                         **********
    07/06/20 11:10 L000000213 QSECOFR     271363 Success     TOCLD           100
                                                                             Bottom
```

16. Verify that all the Volumes used for the Full-System Backup no longer have a status of *TRF
    - **WRKMEDBRM TYPE(*TRF)**
    - You should not see any Volumes in the list

17. As with other recoveries that are performed using BRMS, a recovery report is used to assist with successful recoveries from save media that has been transferred to the cloud. To generate a report for recovery from the cloud, run the following command:

    STRRCYBRM OPTION(*CTLGRP) ACTION(*REPORT) CTLGRP((QCLDBSYS01 1) (QCLDBIPL01 2))

NOTES:

- It is important to review the recovery report to ensure it is complete. If any of the media produced during the backup has not been successfully transferred to the cloud, it will not be included in the recovery report. The CTLGRP and PERIOD parameters that were specified on the STRRCYBRM command above will help identify objects that were saved to volumes that have not been transferred to the

cloud. If objects are on volumes that were not included in the recovery report, they will be listed in a missing objects Attention section near top of the report.

- Once the recovery report has been verified, the report should be stored in a safe location so it can be referred to during a recovery.

- On Monday through Saturday you can run daily incremental backups using the following control groups:

  STRBKUBRM CTLGRP(QCLDBUSR01) SBMJOB(*NO)

  STRBKUBRM CTLGRP(QCLDBGRP01) SBMJOB(*NO)

Full-System Recovery from the Cloud using IBM i as an NFS Server

Setting up IBM i Network Install Server with NFS Server and NFS Client

1. *Provision an IBM i VSIs in target PowerVS location to be an NFS Server.*
2. *IBM i NFS Server should have a minimum of Version 7.2 with current PTFs.*
3. *To use virtual optical images through an NFS server, the IBM i NFS client must meet the following requirements:*
4. *The IBM i must have a Version 4 Internet Protocol (IP) address.*
   - During set up, the shared NFS server directory must be mounted over a directory on the IBM i client.
   - Either an IBM i service tools server or a LAN console connection must be configured using a Version 4 IP address.
   - A 632B-003 virtual optical device must be created using the IP address of the NFS server.

   Note: The IBM i IP address and the IBM i service tools server (LAN console connection) IP address may be the same.

Requirements creating a PowerVSI NFS Server Example:

1. *Create IBM i VSI NFS Server in PowerVS location*
   - *Make sure you have enough disk storage to support the size of the SAVSYS or Control Group QCLDBIPLxx.*
2. *Create IBM i VSI Client in Server in the same PowerVS location*
   - *Make sure you have double the disk storage to support the size of the IMAGE Catalog volumes (User Data), and the Full-System Restore.*
3. *Verify that the IBM I VSI Client Server can ping itself and the ip address of IBM i VSI NFS Server.*
4. *Verify that the IBM i VSI NFS Server can ping itself and the ip address of IBM i VSI Client Server.*

Creating an IBM i PowerVSI NFS Server Example:

- Create IBM i VSI NFS Server in your PowerVS location
  - Follow the steps in the section called:
    - *Provision AIX or IBM i VSIs in each PowerVS location*
- Once you have completed the provisioning and added your storage you can continue with the next steps
- Create a mount directory for the IBM i VSI NFS server
  - First run the command MKDIR DIR('/install')
  - Second run the command MKDIR DIR('/install/sysipl')
    - This will create a new directory in the IFS called /install/sysipl

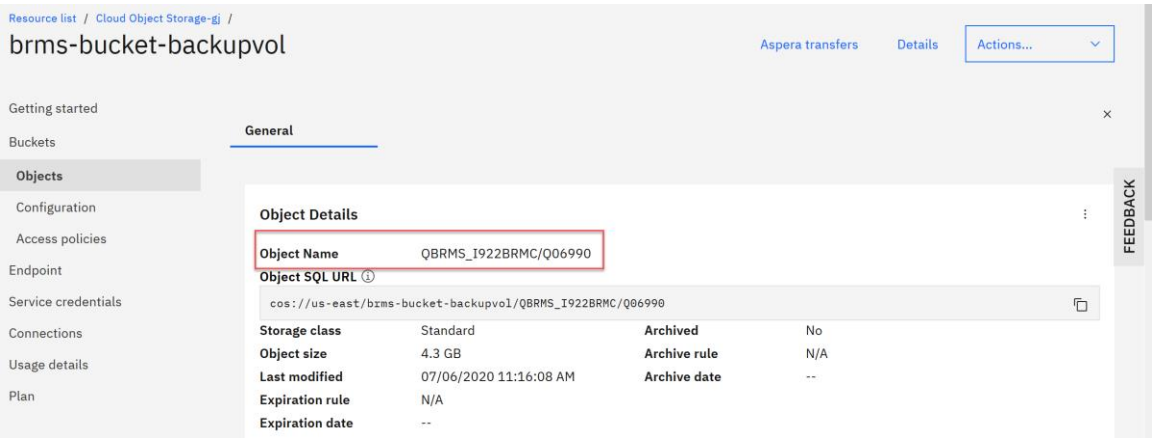
```
                              Work with Object Links

Directory  . . . . :   /install

Type options, press Enter.
  2=Edit   3=Copy   4=Remove   5=Display   7=Rename   8=Display attributes
  11=Change current directory ...

Opt   Object link            Type     Attribute    Text
_     sysipl                 DIR
```

- From the Cloud, copy the volumes created with the QCLDBIPL01 backup. In our example we had three volumes.
  Example: (Q06990, Q07898, Q08807)
  - Resource name = the cloud resource that was created
  - Submit to batch = *YES (you can submit all 3 at the same time)
  - Cloud file name = Full name of the volume on the cloud
  - Display the volumes on the COS
    - Cloud Object Storage>Bucket>Object name>Details
  - Local file name = Full directory path plus volume name
    Note:
    BRMS stores media in the cloud as files under directory QBRMS_XXXXXXXX, where XXXXXXXX is the name of the system that performed the backups.



Use the command CPYFRMCLD

```
                    Copy ICC File from Cloud (CPYFRMCLD)

  Type choices, press Enter.

  Resource name  . . . . . .  > TOR1CLD      Name
  Submit to batch  . . . . . . > *NO          *NO, *YES
  Cloud file name  . . . . . . > QBRMS_I922BRMC/Q06990

  Local file name  . . . . .  > '/install/sysipl/Q06990'
```

- Check the status of the transfer jobs
  - **WRKSTSICC STATUS(*ALL)**

```
__  QBRMS_I922BRMC/Q06990                                          **********
     07/06/20 16:17 QPADEV0002 QSECOFR    272105 Success     FRMCLD        100
__  QBRMS_I922BRMC/Q07898                                          **7
     07/06/20 16:43 L000000221 QSECOFR    273293 Active      FRMCLD         27
__  QBRMS_I922BRMC/Q08807                                          **4
     07/06/20 16:44 L000000222 QSECOFR    273307 Active      FRMCLD         24
                                                                      Bottom
```

- Go to the next step once all volumes have completed the transfer and show a status of “Success”

Create Virtual Optical Device on IBM i VSI NFS Server

1. Create Virtual Optical Deive called “INSTALL”

CRTDEVOPT DEVD(INSTALL) RSRCNAME(*VRT) LCLINTNETA(*N)

```
                    Create Device Desc (Optical) (CRTDEVOPT)

 Type choices, press Enter.

 Device description . . . . . . . > INSTALL      Name
 Resource name  . . . . . . . . . > *VRT         Name, *NONE, *VRT...
 Device type  . . . . . . . . . .   *RSRCNAME    *RSRCNAME, 63BC, 63B8, 632A...
 Local internet address . . . . .   *NONE        *NONE, *SRVLAN
 Online at IPL  . . . . . . . . .   *YES         *YES, *NO
 Message queue  . . . . . . . . .   *SYSOPR      Name
   Library  . . . . . . . . . . .                Name, *LIBL, *CURLIB
 Text 'description' . . . . . . .   *BLANK
```

2. Vary on Virtual Optical Device

WRKCFGSTS *DEV INSTALL

```
                        Work with Configuration Status                I922BRMC
                                                        07/06/20  18:09:00 CDT
 Position to  . . . . .   __________   Starting characters

 Type options, press Enter.
   1=Vary on   2=Vary off   5=Work with job   8=Work with description
   9=Display mode status    13=Work with APPN status...

 Opt  Description       Status                -------------Job--------------
 1_   INSTALL           VARIED OFF
```

3. Create Image Catalog
    - Image catalog = SYSIPL
        - Directory = ‘/install/sysipl’

CRTIMGCLG IMGCLG(SYSIPL) DIR('/install/sysipl')

```
                        Create Image Catalog (CRTIMGCLG)

 Type choices, press Enter.

 Image catalog  . . . . . . . . . > SYSIPL       Name
 Directory  . . . . . . . . . . . > '/install/sysipl'

 Image catalog type . . . . . . .   *OPT         *OPT, *TAP
 Create directory . . . . . . . .   *YES         *YES, *NO
 Import image catalog . . . . . .   *NO          *NO, *YES
 Catalog ASP threshold  . . . . .   *CALC        1-99, *CALC, *MAX
 Add virtual volumes  . . . . . .   *NONE        1-256, *NONE, *DIR
```

4. Add Image Catalog Entry

ADDIMGCLGE

- For the First volume Q06990

```
                    Add Image Catalog Entry (ADDIMGCLGE)

 Type choices, press Enter.

 Image catalog  . . . . . . . . . . > SYSIPL       Name
 From optical device, or  . . . .     __________   Name, *VOL
 From image file  . . . . . . . . . > Q06990
 ______
 To image file  . . . . . . . . . . > Q06990
 ______
 Image catalog index  . . . . . . .   *AVAIL       1-256, *AVAIL
 Replace catalog entry  . . . . . .   *NO         *NO, *YES, *INSERT
 Text 'description' . . . . . . . .   *GEN
```

5. Add the next 2 using the same name for the TOFILE (To image file)

```
                    Add Image Catalog Entry (ADDIMGCLGE)

 Type choices, press Enter.

 Image catalog  . . . . . . . . . . > SYSIPL       Name
 From optical device, or  . . . .     __________   Name, *VOL
 From image file  . . . . . . . . . > Q07898
 ______
 To image file  . . . . . . . . . . > Q07898
 ______
 Image catalog index  . . . . . . .   *AVAIL       1-256, *AVAIL
 Replace catalog entry  . . . . . .   *NO         *NO, *YES, *INSERT
 Text 'description' . . . . . . . .   *GEN
```

```
                    Add Image Catalog Entry (ADDIMGCLGE)

 Type choices, press Enter.

 Image catalog  . . . . . . . . . . > SYSIPL       Name
 From optical device, or  . . . .     __________   Name, *VOL
 From image file  . . . . . . . . . > Q08807
 ______
 To image file  . . . . . . . . . . > Q08807
 ______
 Image catalog index  . . . . . . .   *AVAIL       1-256, *AVAIL
 Replace catalog entry  . . . . . .   *NO         *NO, *YES, *INSERT
 Text 'description' . . . . . . . .   *GEN
 ______
```

6. Load Image Catalog
   - Image catalog = SYSIPL
   - Virtual device = INSTALL

```
                    Load or Unload Image Catalog (LODIMGCLG)

 Type choices, press Enter.

 Image catalog  . . . . . . . . . . > SYSIPL       Name
 Option . . . . . . . . . . . . . .   *LOAD       *LOAD, *UNLOAD
 Virtual device . . . . . . . . . . > INSTALL      Name
 Write protect  . . . . . . . . . .   *DFT        *DFT, *ALL, *NONE
 Library mode . . . . . . . . . . .   *NO         *NO, *YES
```

7. Verify Image Catalog
    - WRKIMGCLG
    - Select Option 10=Verify for image catalog “SYSIPL”
    - Verify type = *LIC
    - Sort image catalog = *YES
    - Network file server share = *YES

```
                              Work with Image Catalogs
                                                                  System:   I922BRMC
Type options, press Enter.
  1=Create   2=Change   4=Delete   8=Load   9=Unload   10=Verify
  12=Work with entries

     Image                                ASP                    Device
Opt  Catalog     Status      Type     Threshold  Device       Status

10   SYSIPL      Ready       Optical    *CALC    INSTALL      Active
     TOR1CLDTAP  Not ready   Tape       *CALC
```

```
                        Verify Image Catalog (VFYIMGCLG)

Type choices, press Enter.

Image catalog  . . . . . . . . . . > SYSIPL        Name
Verify type  . . . . . . . . . . . > *LIC          *UPGRADE, *PTF, *OPSYS...
Sort image catalog . . . . . . . . > *YES          *NO, *YES
Network file server share  . . . . > *YES          *NO, *YES
Language . . . . . . . . . . . . .   *DFT          2901-2999, *DFT
```

8. Work with Entries
    - Select Option 12=Work with entries for image catalog “SYSIPL”
    - Verify the Directory
    - Verify the Index order of the image file name (the image file that contains the SAVSYS should be the first one)
    - Verify the status (Mounted or Loaded)

```
                              Work with Image Catalogs
                                                                  System:   I922BRMC
Type options, press Enter.
  1=Create   2=Change   4=Delete   8=Load   9=Unload   10=Verify
  12=Work with entries

     Image                                ASP                    Device
Opt  Catalog     Status      Type     Threshold  Device       Status

12   SYSIPL      Ready       Optical    *CALC    INSTALL      Active
     TOR1CLDTAP  Not ready   Tape       *CALC
```

```
                         Work with Image Catalog Entries
                                                                System:   I922BRMC
 Catalog  . . :   SYSIPL                  Status . . . :   Ready
 Type . . . . :   Optical                 Device . . . :   INSTALL

 Directory  . . . . :   /install/sysipl

 Type options, press Enter.
   1=Add   2=Change       4=Remove   6=Mount   8=Load   9=Unload
   10=Initialize volume   12=Work with volume

 Opt   Index  Status      Image File Name
 _    *AVAIL
 __        1  Mounted     Q06990
 __        2  Loaded      Q07898
 __        3  Loaded      Q08807
```

9. Work with Object Links
   - WRKLNK OBJ('/install/sysipl/*')
   - Verify that a BOOTP DIR was created
   - Verify that a VOLUME_LIST was created

```
                              Work with Object Links

 Directory  . . . . :   /install/sysipl

 Type options, press Enter.
   2=Edit   3=Copy   4=Remove   5=Display   7=Rename   8=Display attributes
   11=Change current directory ...

 Opt   Object link            Type      Attribute    Text
 _     BOOTP                  DIR
 __    QIMGCLG                STMF
 __    Q06990                 STMF
 __    Q07898                 STMF
 __    Q08807                 STMF
 __    Q23411                 STMF
 __    Q24319                 STMF
 __    VOLUME_LIST            STMF
```

10. Run command to start NFS Servers

    STRNFSSVR SERVER(*ALL)

11. Run command to change NFS export options

    CHGNFSEXP OPTIONS('-i -o ro') DIR('/install/sysipl')

```
                         Change NFS Export (CHGNFSEXP)

 Type choices, press Enter.

 NFS export options . . . . . . . > '-i -o ro'
                                                                          ...
 Directory  . . . . . . . . . . . > '/install/sysipl'
```

12. Run command to change Object Authority
    CHGAUT OBJ('/install/sysipl') USER(*PUBLIC) DTAAUT(*RWX) SUBTREE(*ALL)

```
                              Change Authority (CHGAUT)

 Type choices, press Enter.

 Object . . . . . . . . . . . . . . > '/install/sysipl'
 User . . . . . . . . . . . . . . . > *PUBLIC        Name, *PUBLIC
                 + for more values
 New data authorities . . . . . . . > *RWX           *SAME, *NONE, *RWX, *RX...
 New object authorities . . . . . .   *SAME          *SAME, *NONE, *ALL...
                 + for more values
 Authorization list . . . . . . . .                  Name, *NONE
 Directory subtree  . . . . . . . . > *ALL           *NONE, *ALL
 Symbolic link  . . . . . . . . . .   *NO            *NO, *YES
```

13. Run command to change TFTP Attributes

CHGTFTPA AUTOSTART(*YES) ALTSRCDIR('/install/sysipl')

Specify the Alternate source directory where the volumes are stored

```
                         Change TFTP Attributes (CHGTFTPA)

 Type choices, press Enter.

 Autostart server . . . . . . . . . > *YES           *YES, *NO, *SAME
 Enable subnet broadcast  . . . .   *YES            *YES, *NO, *SAME
 Number of server jobs:
   Minimum  . . . . . . . . . . . .   2              1-20, *SAME, *DFT
   Maximum  . . . . . . . . . . . .   6              1-250, *SAME, *DFT
 Server inactivity timer  . . . .   30               1-1440, *SAME, *DFT
 ASCII single byte CCSID:
   Coded character set identifier   00819            1-65532, *SAME, *DFT
 Maximum block size . . . . . . .   1024             512-65464, *SAME, *DFT
 Connection response timeout  . .   60               1-600, *SAME, *DFT
 Allow file writes  . . . . . . .   *NONE            *DFT, *NONE, *CREATE...
 Alternate source directory . . . > '/install/sysipl'
```

14. Run command to change Object Authority

CHGAUT OBJ('/install/sysipl') USER(QTFTP) DTAAUT(*RX) SUBTREE(*ALL)

```
                              Change Authority (CHGAUT)

 Type choices, press Enter.

 Object . . . . . . . . . . . . . . > '/install/sysipl'
 User . . . . . . . . . . . . . . . > QTFTP          Name, *PUBLIC
                 + for more values
 New data authorities . . . . . . . > *RX            *SAME, *NONE, *RWX, *RX...
 New object authorities . . . . . .   *SAME          *SAME, *NONE, *ALL...
                 + for more values
 Authorization list . . . . . . . .                  Name, *NONE
 Directory subtree  . . . . . . . . > *ALL           *NONE, *ALL
 Symbolic link  . . . . . . . . . .   *NO            *NO, *YES
```

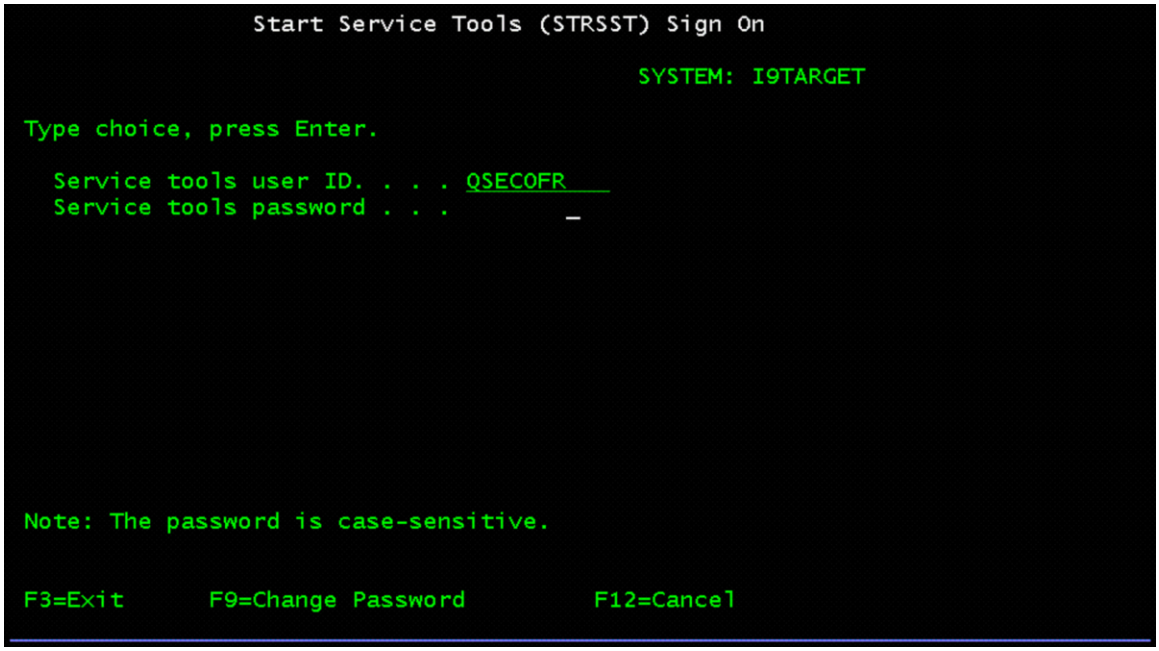
15. End TCP Server TFTP
    ENDTCPSVR SERVER(*TFTP)
16. *Start TCP Server TFTP*
    STRTCPSVR SERVER(*TFTP)

Creating an IBM i PowerVSI Client Server Example:

1. Create IBM i VSI Client Server in your PowerVS location
   - Follow the steps in the section called:
     - *Provision AIX or IBM i VSIs in each PowerVS location*
2. Once you have completed the provisioning and added your storage you can continue with the next steps

Configure IBM i PowerVSI Client Server (TARGET), NFS Network LAN install device

3. Start System Service Tools (SST)
   - STRSST and Sign On



4. Select Option 8=Work with service tools user IDs and Devices

```
                    System Service Tools (SST)

 Select one of the following:

      1. Start a service tool
      2. Work with active service tools
      3. Work with disk units
      4. Work with diskette data recovery
      5. Work with system partitions

      7. Work with system security
      8. Work with service tools user IDs and Devices




 Selection
      8

 F3=Exit         F10=Command entry         F12=Cancel
```

5. Select F13=Select STS LAN adapter
    - Press Next, then F13 on the bottom of the console screen

```
                 Work With Service Tools User IDs And Devices
                                                        System:   I9TARGET
 Select one of the following:

      1. Service tools user IDs
      2. Service tools device IDs
      3. Select console
      4. Configure service tools LAN adapter
      5. Change service tools password level        PWLVL 1
      6. Work with service tools security options




 Selection

 F3=Exit   F5=Display LAN adapter configuration on DASD
 F6=Clear LAN adapter configuration on DASD   F12=Cancel
 F13=Select STS LAN adapter
                                                  1
MA*    A          2          MW                                  20/007
PF13  PF14  PF15  PF16  PF17  PF18  Enter  Rule  EndFld  ErInp  Reset  DUP ...
PF19  PF20  PF21  PF22  PF23  PF24  Clear  AltCur  ErFld  ErEOF  Next...
```

6. Option 1=Select

- Use the same resource used to communicate with the IBM i VSI NFS Server

Note:

The CMNxx Resource needs to be on the same VLAN (public, direct, or DL) as your IBM i VSI NSF Server. You also need to End TCP/IP and Vary Off the Line Description using that CMNxx.

```
                          Select LAN Adapter Port
                                                          System:   I9TARGET
Type option, press Enter.
  1=Select   5=Display details

          Resource                        Serial
Option    Name          Type   Model      Number          LOC   Selected
  1       CMN03         268C   002        00-00000
```

7. Configure Service Tools LAN Adapter
   - IP version allowed = IPV4
   - Internet address = you can use the same ip address of the client (TARGET) IBM i VSI
   - Gateway router address = use the same gateway on the client (TARGET)
   - Subnet mask = use the same
   - Press F7=Store
   - Press F13= Deactivate
   - Press F14=Activate

Note:

After you press F14 Activate, the addapter will restart, which may not be ready right away.

```
                    Configure Service Tools LAN Adapter
                                                          System:   I9TARGET
Type choices, press Enter to verify input.
 Resource name . . . . . . . : CMN03        VLAN ID __0 (0 is default)
 Adapter type  . . . . . . . : 268C
 Adapter model . . . . . . . : 002
 Adapter serial number . . . : 00-D00004

 Host name for service tools . 788D470404
 Node  . . . . . . . . . . . . 000000000000     (0 is default)
 Duplex  . . . . . . . . . . . AUTO             HALF, FULL, AUTO
 Network speed . . . . . . . . AUTO     AUTO, 10, 100, 1000, 10G, 40G

 IP version allowed  . . . . . IPV4             IPV4, IPV6, BOTH
 Internet address  . . . . . . 192.168.6.151
 Gateway router address  . . . 192.168.6.101
 Subnet mask . . . . . . . . . 255.255.255.0

 IPV6 address  . . . . . . . . ________________________________________
 IPV6 interface ID . . . . . . 0000000000000000 (0 is default)
   2                 3                 1
F3=Exit          F5=Load          F6=Clear   F7=Store   F12=Cancel
F13=Deactivate   F14=Activate     F17=Deactivate followed by activate
```

8. Select F3=Exit to exit out of Service Tools
9. Work with IP IPv4 Connection Status and verify port 3000 status
   - Command NETSTAT
   - Option 3=Work with IPv4 connection status
   - Press F14=Display port numbers
   - Check to see that port number 3000 (as-sts) is running which is (Service Tools Server)

```
                    Work with IPv4 Connection Status
                                                          System:   I9TARGET
Type options, press Enter.
  3=Enable debug   4=End   5=Display details   6=Disable debug
  8=Display jobs

     Remote           Remote  Local
Opt  Address           Port    Port  User         Bytes Out    Bytes In
 _   *                    *    2011  QLWISVR              0           0
 _   *                    *    3000  QSRV                 0           0
 _   *                    *    5026  QSRVAGT              0           0
 _   *                    *    5544  QYPSJSVR             0           0
 _   *                    *    5555  QYPSJSVR             0           0
```

```
                                                                  System:   I9TARGET
Type options, press Enter.
  3=Enable debug   4=End   5=Display details   6=Disable debug
  8=Display jobs

     Remote           Remote     Local
Opt  Address          Port       Port        Idle Time  State
 _   *                *          as-admi >   000:04:34  Listen
 _   *                *          as-sts      000:05:02  Listen
 _   *                *          5026        000:04:30  Listen
 _   *                *          as-mgtc >   000:04:53  Listen
 _   *                *          as-mgtc >   000:04:52  Listen
```

10. On the Client Server Create Optical Device
    - CRTDEVOPT
    - Press F4 to prompt
    - Local internet address = *SRVLAN
    - Remote internet address = the ip address of the IBM i VSI NFS Server
    - Network image directory = '/install/sysipl'

```
                    Create Device Desc (Optical) (CRTDEVOPT)

Type choices, press Enter.

Device description . . . . . . . > INSTALL      Name
Resource name  . . . . . . . . . > *VRT         Name, *NONE, *VRT...
Device type  . . . . . . . . . .   *RSRCNAME    *RSRCNAME, 63BC, 63B8, 632A...
Local internet address . . . . .  *SRVLAN       *NONE, *SRVLAN
Remote internet address  . . . .  '192.168.6.117'

Network image directory  . . . .  '/install/sysipl'

User ID number . . . . . . . . .   0            0-4294967295
Group ID number  . . . . . . . .   0            0-4294967295
Online at IPL  . . . . . . . . .   *YES         *YES, *NO
Message queue  . . . . . . . . .   *SYSOPR      Name
  Library  . . . . . . . . . . .                Name, *LIBL, *CURLIB
Text 'description' . . . . . . .   *BLANK
```

11. WRKCFGSTS *DEV INSTALL
    - Option 1= Vary On for device INSTALL

```
                        Work with Configuration Status                I9TARGET
                                                          07/07/20  20:20:46 CDT
Position to  . . . . .   __________   Starting characters

Type options, press Enter.
  1=Vary on   2=Vary off   5=Work with job   8=Work with description
  9=Display mode status    13=Work with APPN status...

Opt  Description       Status                -------------Job--------------
1_   INSTALL           VARIED OFF
```

12. Verify you can access the remote image catalog
    WRKIMGCLGE IMGCLG(*DEV) DEV(INSTALL)

```
                    Work with Catalog Entries (WRKIMGCLGE)

Type choices, press Enter.

Image catalog  . . . . . . . . . . > *DEV        Name, *DEV
Virtual device . . . . . . . . . . > INSTALL     Name
```

13. Verify the Catalog, Type, and Directory
    - /install/sysipl
    - Volumes should be Mounted and Loaded

```
                        Work with Image Catalog Entries
                                                          System:   I9TARGET
Catalog  . . :   *RMTCLG              Device . . . :   INSTALL
Type . . . . :   Remote               Device Status:   Active
Directory  . :   /install/sysipl

Type options, press Enter.
  6=Mount   12=Work with volume

Opt     Index    Status        Volume                          Access
__      *AVAIL
__          1    Mounted       Q06990                          *READONLY
__          2    Loaded        Q07898                          *READONLY
__          3    Loaded        Q08807                          *READONLY
```

Install Licensed Internal Code LIC on IBM i PowerVSI Client Server (TARGET) using NFS Network Server

WARNING

Before you begin the scratch install on the (TARGET) IBM i VSI, be sure to document all your current network information. You will have to recreate these after the install in order to complete the restore:

As an Example: You should document the following:

- *CFGTCP*
  - *Work with TCP/IP interfaces*

```
Internet          Subnet               Line       Line
Address           Mask             Description  Type

127.0.0.1         255.0.0.0        *LOOPBACK    *NONE
192.168.6.117     255.255.255.0    CLOUDINIT1   *ELAN
192.168.142.76    255.255.255.248  CLOUDINIT2   *ELAN
```

  - *Work with TCP/IP routes*

```
Route             Subnet           Next              Preferred
Destination       Mask             Hop               Interface

*DFTROUTE         *NONE            192.168.6.101     *NONE
*DFTROUTE         *NONE            192.168.142.73    *NONE
10.166.112.0      255.255.255.0    192.168.6.101     *NONE
```

- *DSPLIND*
  - *CLOUDINIT0*
  - *CLOUDINIT1*
  - *CLOUDINIT2*
    - *Line description . . . . . : CLOUDINIT2*
    - *Option . . . . . : *BASIC*
    - *Category of line . . . . . : *ELAN*
    - *Resource name . . . . . : CMN04*
- *WRKHDWRSC *CMN*
  - *Display all the CMNxx resource detail you have and document the Location and resource name*
    - *Resource name . . . . . : CMN03*
    - *Location : U9009.22A.788D380-V5-C4-T1*

1. Start Network Install
    - STRNETINS press F4 to prompt
    - Network optical device = INSTALL
    - Installation option = *LIC
    - Keylock mode = MANUAL

```
                        Start Network Install (STRNETINS)

 Type choices, press Enter.

 Network optical device . . . . . > INSTALL     Name
 Installation option  . . . . . . > *LIC        *ALL, *OPSYS, *LNG, *LIC
 Keylock mode . . . . . . . . . . > *MANUAL      *NORMAL, *MANUAL
 IPL source . . . . . . . . . . .   B            B, A
 Language . . . . . . . . . . . .   *DFT         2901-2999, *DFT
 Confirm  . . . . . . . . . . . .   *YES         *YES, *NO
```

2. Press F16 to confirm power down

```
_                       Confirm Power Down of System

 System  . . . . . . . . . . . . . . . . :   I9TARGET


 To confirm power down, press F16.
 To cancel, press F12.

                                                                  Bottom
 F12=Cancel   F16=Confirm
```

COMM657 was displayed for around 15 minutes.

```
MA?    A            COMM657
PF1  PF2  PF3  PF4  PF5  PF6  Enter  PA1  Attn  Insert  Backt...  NewLi...
PF7  PF8  PF9  PF10 PF11 PF12 Clear  PA2  SysReq Delete  FldExit   Next...
```

3. Select Option 1=Install Licensed Interanl Code

```
                        Install Licensed Internal Code
                                                                System:   G708D570
Select one of the following:

     1. Install Licensed Internal Code
     2. Work with Dedicated Service Tools (DST)
     3. Define alternate installation device

Selection
     1

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```

4. Select Option 2=Install Licensed Internal Code and Initialize System

```
                      Install Licensed Internal Code (LIC)

Disk selected to write the Licensed Internal Code to:
         Serial Number   Type   Model   I/O Bus   Controller   Device
        Y43317000E0A     2145    050        0          0          0

Select one of the following:

     1. Restore Licensed Internal Code
     2. Install Licensed Internal Code and Initialize system
     3. Install Licensed Internal Code and Recover Configuration
     4. Install Licensed Internal Code and Restore Disk Unit Data
     5. Install Licensed Internal Code and Upgrade Load Source

Selection
     2

F3=Exit          F12=Cancel
```

5. Press F10 to Continue

```
                Install LIC and Initialize System - Confirmation

Warning:
    All data on this system will be destroyed and the Licensed
    Internal Code will be written to the selected disk if you
    choose to continue the initialize and install.

    Return to the install selection screen and choose one of the
    other options if you want to perform some type of recovery
    after the install of the Licensed Internal Code is complete.



    Press F10 to continue the install.
    Press F12 (Cancel) to return to the previous screen.
    Press F3 (Exit) to return to the install selection screen.





F3=Exit          F10=Continue          F12=Cancel
```

This took about 15 minutes plus 5 minutes for the IPL to complete.

```
                        Initialize the Disk - Status

 The load source disk is being initialized.



 Elapsed time in minutes . . . . . . . . :       2.5









 Please wait.


 Wait for next display or press F16 for DST main menu
```

```
                    Install Licensed Internal Code - Status

 Install of the Licensed Internal Code in progress.

              +-----------------------------------------------------+
 Percent      |                      60%                            |
 complete     +-----------------------------------------------------+

 Elapsed time in minutes  . . . . . . . . :       0.5



 Please wait.

 Wait for next display or press F16 for DST main menu
```

6. Press F10 to Accept the problems and continue
    - You will get this screen if you have more disk to add to the ASP

```
                    Disk Configuration Attention Report

 Type option, press Enter.
   5=Display Detailed Report

 Press F10 to accept all the following problems and continue.
 The system will attempt to correct them.

 Opt  Problem
  _   New disk configuration
          _



 F3=Exit   F10=Accept the problems and continue   F12=Cancel
```

7. At the IPL or Install the System Menu
    - Select Option 3 = Use Dedicated Service Tools (DST)

```
                         IPL or Install the System
                                                              System:   G708D570
Select one of the following:

     1. Perform an IPL
     2. Install the operating system
     3. Use Dedicated Service Tools (DST)
     4. Perform automatic installation of the operating system
     5. Save Licensed Internal Code

Selection
     3

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```

QSECOFR upper case for the password

```
                    Dedicated Service Tools (DST) Sign On
                                                              System:   G708D570
Type choices, press Enter.

  Service tools user . . . . . . . . . . .   qsecofr___
  Service tools password . . . . . . . . .          _
```

8. Change the service tools user ID QSECOFR password

```
                         Change Service Tools User Password
                                                              System:   G708D570
Service tools user ID name  . . . . . . . :  QSECOFR
Password last changed . . . . . . . . . . :  06/01/20

Type choices, press Enter.
  Current password  . . . . . . . . . . . .  _

  New password  . . . . . . . . . . . . . .

  New password (to verify)  . . . . . . . .

F3=Exit   F12=Cancel
Password is correct but set to expired
```

9. On the Use Dedicated Service Tools (DST) Menu
    - Select Option 4=Work with disk units
        - This is when you can add non-configured disk to you system

```
                    Use Dedicated Service Tools (DST)
                                                          System:   G708D570
Select one of the following:

     1. Perform an IPL
     2. Install the operating system
     3. Work with Licensed Internal Code
     4. Work with disk units
     5. Work with DST environment
     6. Select DST console mode
     7. Start a service tool
     8. Perform automatic installation of the operating system

    10. Work with remote service support

    13. Work with system security
    14. End batch restricted state


Selection
     4_

F3=Exit   F12=Cancel
```

10. Select Option 1=Work with disk configuration

```
                         Work with Disk Units

Select one of the following:

     1. Work with disk configuration
     2. Work with disk unit recovery

Selection
     1
```

11. Select Option 3=Work with ASP configuration

```
                         Work with Disk Configuration

Select one of the following:

     1. Display disk configuration
     2. Work with ASP threshold
     3. Work with ASP configuration
     4. Work with mirrored protection
     5. Work with device parity protection
     6. Work with disk compression
     7. Work with hot spare protection
     8. Work with encryption

Selection
     3
```

12. Select Option 3=Add units to ASPs

```
                         Work with ASP Configuration

Select one of the following:

     1. Display disk configuration capacity
     2. Delete user ASP
     3. Add units to ASPs
     4. Delete ASP data
     5. Change ASP storage threshold
     6. Move units from one ASP to another
     7. Work with removing units from configuration
     8. Add units to ASPs and balance data

Selection
     3
```

13. Select Option 3=Add units to existing ASPs

```
                         Add Units to ASPs

Select one of the following:

     1. Create unencrypted ASPs
     2. Create encrypted ASPs
     3. Add units to existing ASPs

Selection
     3
```

14. Specify ASP 1 for each unit to add

```
                         Specify ASPs to Add Units to

Specify the existing ASP to add each unit to.

Specify  Serial                                      Resource
  ASP    Number            Type  Model  Capacity     Name
  1__    Y43317000E0D      2145   050     114532     DMP003
```

15. Press F10 to Ignore problems and continue

```
                          Problem Report

 Note: Some action for the problems listed below may need to
 be taken.  Please select a problem to display more detailed
 information about the problem and to see what possible
 action may be taken to correct the problem.

 Type option, press Enter.
   5=Display Detailed Report

 OPT  Problem
  _   Unit possibly configured for Power PC AS



 F3=Exit      F10=Ignore problems and continue      F12=Cancel
```

16. Press Enter to confirm your choice for Add units

```
                          Confirm Add Units

 Add will take several minutes for each unit.  The system will
 have the displayed protection after the unit(s) are added.

 Press Enter to confirm your choice for Add units.
 Press F9=Capacity Information to display the resulting capacity.
 Press F10=Confirm Add and Balance data on units.
 Press F12=Cancel to return and change your choice.

           Serial                      Resource                      Hot Spare
 ASP Unit  Number          Type Model  Name       Protection         Protection
   1                                               Unprotected
        1  Y43317000E0A    2145  050   DMP001     Unprotected             N
        2  Y43317000E0D    2145  050   DMP003     Unprotected             N



 F9=Resulting Capacity              F10=Add and Balance
 F11=Display Encryption Status      F12=Cancel
```

```
                                Function Status

 You selected to add units.



                                        7 % Complete
```

```
                          Add Units to ASPs

 Select one of the following:

      1. Create unencrypted ASPs
      2. Create encrypted ASPs
      3. Add units to existing ASPs



 Selection
      _

 F3=Exit         F12=Cancel
  Selected units have been added successfully
```

17. Verify disk units have been added
    - Select Option 1=Work with disk configuration

```
                              Work with Disk Units

Select one of the following:

     1. Work with disk configuration
     2. Work with disk unit recovery

Selection
     1
```

18. Select Option 1=Display disk configuration

```
                         Work with Disk Configuration

Select one of the following:

     1. Display disk configuration
     2. Work with ASP threshold
     3. Work with ASP configuration
     4. Work with mirrored protection
     5. Work with device parity protection
     6. Work with disk compression
     7. Work with hot spare protection
     8. Work with encryption

Selection
     1
```

19. Select Option 1=Display disk configuration status

or

Select Option 2=Display disk configuration capacity

```
                          Display Disk Configuration

Select one of the following:

     1. Display disk configuration status
     2. Display disk configuration capacity
     3. Display disk configuration protection
     4. Display non-configured units
     5. Display device parity status
     6. Display disk hardware status
     7. Display disk compression status
     8. Display hot spare disk unit status
     9. Display disk path status
    10. Display encryption status
    11. Display protection for multiple connection disk units
    12. Display status of remove operation
    13. Display mirrored suspended/resuming units


Selection
     1_
```

```
_                      Display Disk Configuration Status

           Serial                          Resource                          Hot Spare
ASP Unit   Number          Type Model Name        Status                      Protection
  1                                               Unprotected
       1   Y43317000E0A    2145  050  DMP001      Configured                       N
       2   Y43317000E0D    2145  050  DMP003      Configured                       N
```

20. Press F3=Exit three times and take Option 1. Exit Dedicated Service Tools (DST)

```
                        Exit Dedicated Service Tools
                                                          System:    G708D570
Select one of the following:

     1. Exit Dedicated Service Tools (DST)
     2. Resume Dedicated Service Tools
```

Install the Base Operating System IBM i Power VSI Client Server (TARGET) using NFS Network Server

1. Select Option 2=Install the operating system

```
                         IPL or Install the System
                                                          System:   G708D570
Select one of the following:

     1. Perform an IPL
     2. Install the operating system
     3. Use Dedicated Service Tools (DST)
     4. Perform automatic installation of the operating system
     5. Save Licensed Internal Code




Selection
     2

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```
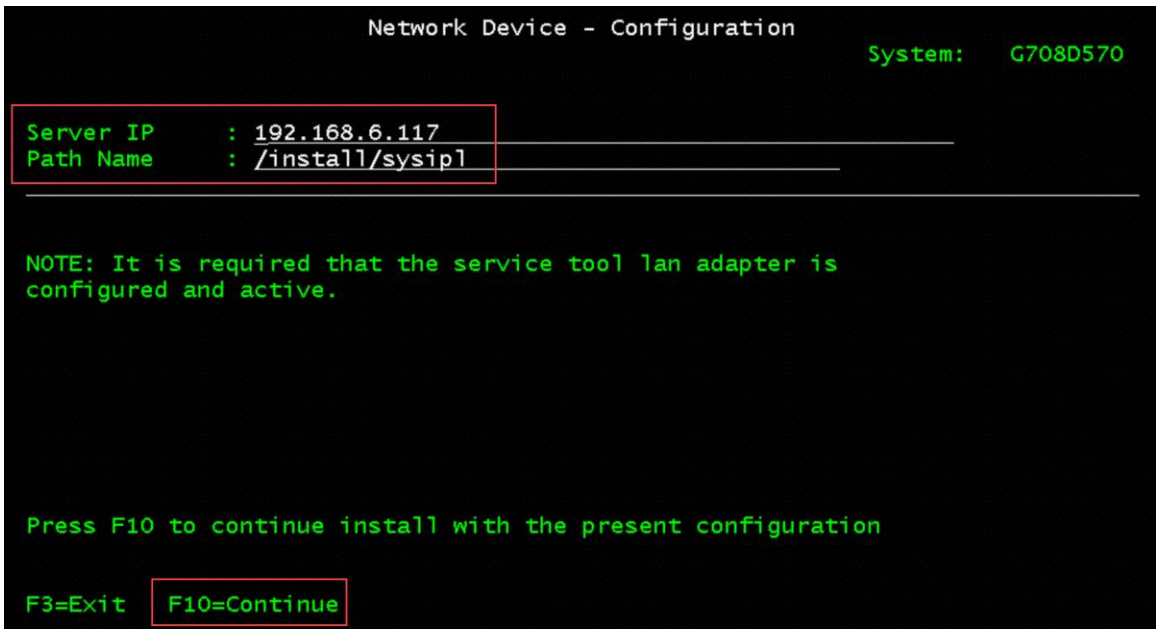
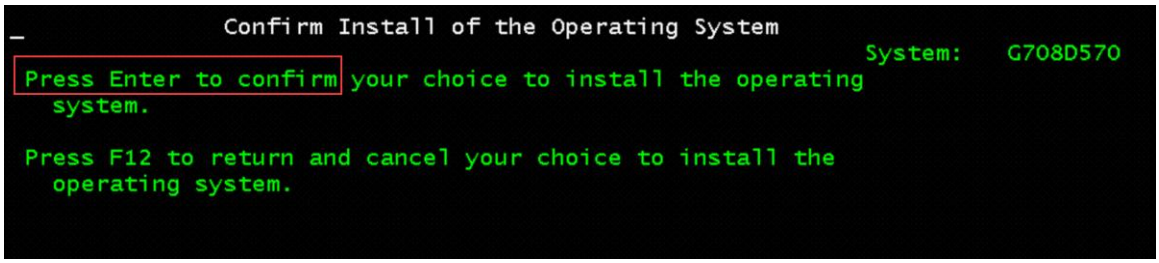

2. Select Option 5=Network device

```
                    Install Device Type Selection
                                                          System:   G708D570
Select the installation device type:

     1. Tape
     2. Optical
     3. Virtual device - preselected image catalog
     4. Current alternate selected device            None
     5. Network device
     6. Optical Container




Selection
     5

F3=Exit   F12=Cancel
```

3. Configure the Network Device
    - Server IP = the IP address of the SOURCE NFS IBM i VSI Server
    - Path Name = the name of the Directory where the image volumes are located
    - Press F10 =Continue



4. Press Enter to confirm



5. Press Enter again

6. Press Enter to confirm

```
_                    Confirm Language Feature Selection
                                                          System:   G708D570
 Language feature  . . . . . . . . . . . . . . :   2924

 Press Enter to confirm your choice for language feature.
   Installing the system will continue.

 Press F12 to return to change your choice for
   language feature.
```

```
_                Licensed Internal Code IPL in Progress
                                                        07/08/20  12:29:55
 IPL:
   Type  . . . . . . . . . . . . . . . :   Attended
   Start date and time . . . . . . . . :   07/08/20  12:29:49
   Previous system end . . . . . . . . :   Abnormal
   Current step / total  . . . . . . . :      16     16
   Reference code detail . . . . . . . :   C6004065

 IPL step                                Time Elapsed   Time Remaining
  Commit Recovery                           00:00:01        00:00:00
  Data Base Initialization                  00:00:01        00:00:00
  Journal IPL Clean up                      00:00:01        00:00:00
  Commit Initialization                     00:00:01        00:00:00
 >Start the operating system

 Item:
   Current / Total . . . . . . . :

 Sub Item:
   Identifier  . . . . . . . . . :
   Current / Total . . . . . . . :
```

7. Select Option 2=Change install options

```
                         Install the Operating System

 Type options, press Enter.

   Install
     option . . . . .   2            1=Take defaults (No other
                                       options are displayed)
                                     2=Change install options

   Date:
     Year . . . . . .   20           00-99
     Month  . . . . .   07           01-12
     Day  . . . . . .   08           01-31

   Time:
     Hour . . . . . .   12           00-23
     Minute . . . . .   29           00-59
     Second . . . . .   56           00-59
```

8. Select Option 1=Restore programs and language objects from the current media set (this will restore system information from the SOURCE system backup)
    - Select Option 2=Keep for Job and output queues
    - Select Option 1=Yes for distribute operating system and on available disk units

```
                         Specify Install Options

Type options, press Enter.

  Restore option . . . . . . .   1   1=Restore programs and language objects
                                       from the current media set
                                     2=Do not restore programs or
                                       language objects
                                     3=Restore only language objects
                                       from current media set
                                     4=Restore only language objects
                                       from a different media set using the
                                       current install device


  Job and output
    queues option  . . . . . .   2   1=Clear, 2=Keep

  Distribute operating system
    on available disk units. .   1   1=Yes, 2=No
```

9. Change **System information** 1=Restore

```
                        Specify Restore Options

Type options, press Enter.

  Restore from the installation media:

    System information . . . .   1   1=Restore, 2=Do not restore

    Edit descriptions  . . . .   1   1=Restore, 2=Do not restore

    Message reply list . . . .   1   1=Restore, 2=Do not restore

    Job descriptions . . . . .   1   1=Restore, 3=Keep customization

    Subsystem descriptions . .   1   1=Restore, 3=Keep customization
```

```
Message ID  . . :   CPI2070                    IBM i Installation Status

             +-----------------------------------------------------+
   Stage 2   | ************             25%                         |
             +-----------------------------------------------------+

 Installation                                                        Objects
 Stage                                                  Completed    Restored
    1 Creating needed profiles and libraries . . . . :    X

 >> 2 Restoring programs to library QSYS . . . . . . :                 03899

    3 Restoring language objects to library QSYS . . :

    4 Updating program table . . . . . . . . . . . . :

    5 Installing database files  . . . . . . . . . . :

    6 Installing base directory objects. . . . . . . :
```

10. User = QSECOFR

```
                                   Sign On
                                                System  . . . . . :   I922BRMC
                                                Subsystem . . . . :   QCTL
                                                Display . . . . . :   QCONSOLE

                User  . . . . . . . . . . . . . . .   QSECOFR___


                Program/procedure . . . . . . . . .   __________
                Menu  . . . . . . . . . . . . . . .   __________
                Current library . . . . . . . . . .   __________


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```

11. Change the following:
    - Start print writers = N
    - Start system to restricted state = Y
    - Set major system options = Y
    - Define or change system at IPL = Y

```
                                IPL Options

Type choices, press Enter.

  System date  . . . . . . . . . . . . . .   07 / 08 / 20   MM / DD / YY
  System time  . . . . . . . . . . . . . .   12 : 42 : 00   HH : MM : SS
  System time zone . . . . . . . . . . . .   QN0600CST2     F4 for list
  Clear job queues . . . . . . . . . . . .   N              Y=Yes, N=No
  Clear output queues  . . . . . . . . . .   N              Y=Yes, N=No
  Clear incomplete job logs  . . . . . . .   N              Y=Yes, N=No
  Start print writers  . . . . . . . . . .   N              Y=Yes, N=No
  Start system to restricted state . . . .   Y              Y=Yes, N=No


  Set major system options . . . . . . . .   Y              Y=Yes, N=No
  Define or change system at IPL . . . . .   Y              Y=Yes, N=No

 Last power-down operation was ABNORMAL
```

12. Verify… Enable automatic configuration = Y

```
                         Set Major System Options

Type choices, press Enter.

  Enable automatic configuration . . . . .   Y              Y=Yes, N=No
  Device configuration naming  . . . . . .   *NORMAL        *NORMAL, *S36
                                                            *DEVADR
  Default special environment  . . . . . .   *NONE          *NONE, *S36
```

13. Select Option 3= System value commands

```
                    Define or Change the System at IPL
                                                          System:   I922BRMC
Select one of the following:

     1. Configuration commands
     2. Change user profile
     3. System value commands
     4. Network attribute commands
     5. General object commands
     6. Work with shared pools
     7. Change IPL attributes

Selection
     3
```

14. Select Option 3=Work with system values

```
                          System Value Commands
                                                          System:   I922BRMC
Select one of the following:

     1. Display system value
     2. Change system value
     3. Work with system values

Selection
     3
```

15. Select Option 2=Change for each of the System Values

- Change and document any of the changes made from the list below:

```
                              Work with System Values
                                                                System:   I922BRMC
Position to  . . . . . .   __________   Starting characters of system value
Subset by Type . . . . .   *ALL_____    F4 for list

Type options, press Enter.
  2=Change    5=Display

         System
Option   Value        Type     Description
  _      QABNORMSW    *SYSCTL  Previous end of system indicator
  _      QACGLVL      *MSG     Accounting level
  _      QACTJOB      *ALC     Initial number of active jobs
  _      QADLACTJ     *ALC     Additional number of active jobs
  _      QADLSPLA     *ALC     Spooling control block additional storage
  _      QADLTOTJ     *ALC     Additional number of total jobs
  _      QALWJOBITP   *SYSCTL  Allow jobs to be interrupted
  2      QALWOBJRST   *SEC     Allow object restore option
  _      QALWUSRDMN   *SEC     Allow user domain objects in libraries
  _      QASTLVL      *SYSCTL  User assistance level
                                                                          More...
F3=Exit   F4=Prompt   F5=Refresh   F11=Display names only   F12=Cancel
```

----- Attention ----------

To prevent the recovery from failing, change the following system values to the new settings when you reach the "Define and Change the System at IPL" task during operating system recovery.

Record the current setting for use after the recovery is complete.

System value	Current setting	New setting
QALWOBJRST	_____	*ALL
QFRCCVNRST	_____	0
QINACTITV	_____	*NONE
QJOBMSGQFL	_____	*PRTWRAP
QJOBMSGQMX	_____	30 (minimum, 64 recommended)
QLMTDEVSSN	_____	0
QLMTSECOFR	_____	0

QMAXSIGN _____ *NOMAX

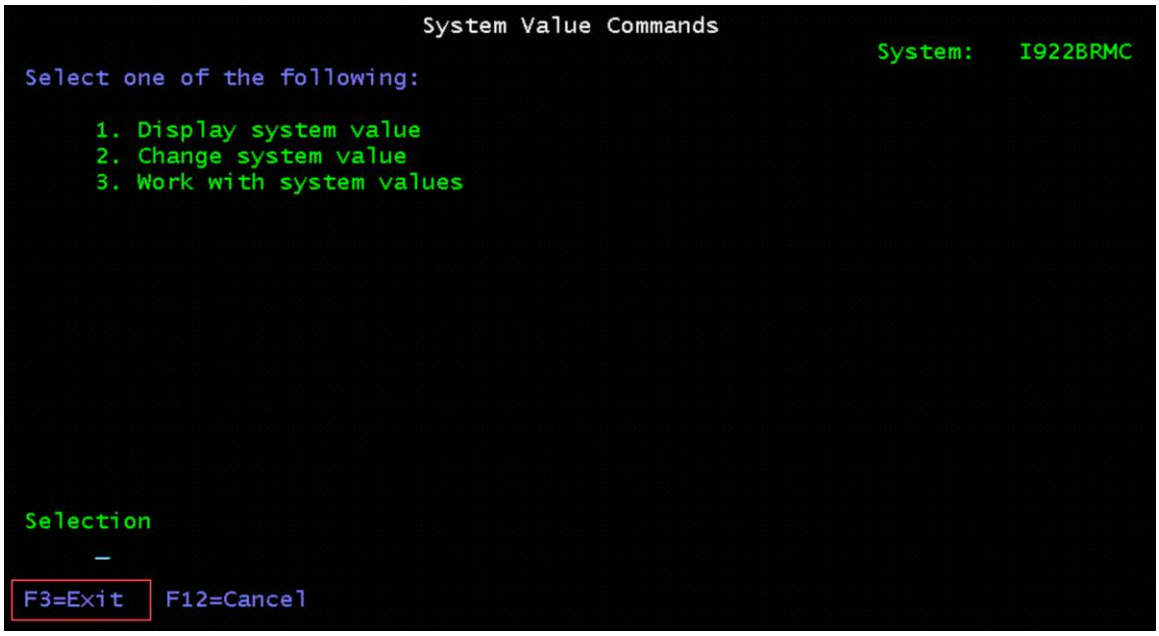
QPFRADJ _____ 2

QPWDEXPITV _____ *NOMAX

QSCANFSCTL _____ *NOPOSTRST

QVFYOBJRST _____ 1

16. Press F3=Exit, two times or until you get the next screen.



17. Press Enter to continue

```
                              Sign-on Information
                                                                  System:   I922BRMC
 Password has expired.  Password must be changed to continue sign-on
 request.

 Press Enter to change your password.
```

18. Change Password

Current password = QSECOFR

```
                              Change Password

 User profile  . . . . . . . . . . . . . . . :  QSECOFR

 Password last changed . . . . . . . . . . . :  07/08/20

 Type choices, press Enter.

   Current password  . . . . . . . . . . . .

   New password  . . . . . . . . . . . . . .

   New password (to verify)  . . . . . . . .
```

19. At the IBM i Main Menu notice the System name changed

```
MAIN                                IBM i Main Menu
                                                                  System:   I922BRMC
Select one of the following:

     1. User tasks
     2. Office tasks
     3. General system tasks
     4. Files, libraries, and folders
     5. Programming
     6. Communications
     7. Define or change the system
     8. Problem handling
     9. Display a menu

    11. IBM i Access tasks

    90. Sign off

Selection or command
===> _
F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F23=Set initial menu
```

20. At the command line type GO LICPGM
    - Option 10=Display Installed Licensed Programs

Notice you have the Base IBM i installed and Library QGPL and QUSRSYS are *BACKLEVEL

```
_                    Display Installed Licensed Programs
                                                          System:   I922BRMC
 Licensed   Installed
 Program    Status       Description
 5770SS1    *BACKLEVEL   Library QGPL
 5770SS1    *BACKLEVEL   Library QUSRSYS
 5770SS1    *COMPATIBLE  IBM i
```

Recover the BRMS Product and Associated Libraries on the IBM i Power VSI Client Server (TARGET) using NFS Network Server

1. On the Client Server Create Optical Device
    - CRTDEVOPT
    - Press F4 to prompt
    - Local internet address = *SRVLAN
    - Remote internet address = the ip address of the IBM i VSI NFS Server
    - Network image directory = '/install/sysipl'

```
                    Create Device Desc (Optical) (CRTDEVOPT)

Type choices, press Enter.

Device description . . . . . . . > INSTALL      Name
Resource name  . . . . . . . . . > *VRT         Name, *NONE, *VRT...
Device type  . . . . . . . . . .   *RSRCNAME    *RSRCNAME, 63BC, 63B8, 632A...
Local internet address . . . . .> *SRVLAN       *NONE, *SRVLAN
Remote internet address  . . . .> '192.168.6.117'
Network image directory  . . . .> '/install/sysipl'
User ID number . . . . . . . . .   0            0-4294967295
Group ID number  . . . . . . . .   0            0-4294967295
Online at IPL  . . . . . . . . .   *YES          *YES, *NO
Message queue  . . . . . . . . .   *SYSOPR      Name
  Library  . . . . . . . . . . .                Name, *LIBL, *CURLIB
Text 'description' . . . . . . .   *BLANK
```

2. WRKCFGSTS *DEV INSTALL
    - Option 1= Vary On for device INSTALL

```
                        Work with Configuration Status                I9TARGET
                                                          07/07/20  20:20:46 CDT
Position to  . . . . .   __________   Starting characters

Type options, press Enter.
  1=Vary on   2=Vary off   5=Work with job   8=Work with description
  9=Display mode status    13=Work with APPN status...

Opt  Description       Status                -------------Job--------------
1_   INSTALL           VARIED OFF
```

3. Verify you can access the remote image catalog
   WRKIMGCLGE IMGCLG(*DEV) DEV(INSTALL)

```
                    Work with Catalog Entries (WRKIMGCLGE)

Type choices, press Enter.

Image catalog  . . . . . . . . . > *DEV         Name, *DEV
Virtual device . . . . . . . . . > INSTALL      Name
```

4. Verify the Catalog, Type, and Directory
    - /install/sysipl
    - Volumes should be Mounted and Loaded

```
                        Work with Image Catalog Entries
                                                                  System:   I9TARGET
Catalog  . . :   *RMTCLG              Device . . . :   INSTALL
Type . . . . :   Remote               Device Status:   Active
Directory  . :   /install/sysipl

Type options, press Enter.
  6=Mount   12=Work with volume

Opt     Index    Status        Volume                          Access
__      *AVAIL
__          1    Mounted       Q06990                          *READONLY
__          2    Loaded        Q07898                          *READONLY
__          3    Loaded        Q08807                          *READONLY
```

Note:

You will find your BRMS Recovery Report from file name "QP1ARCY"

"Recovery Report"

5. Follow Step 004 in the BRMS Recovery Report
    - ***STEP 004 : Recover the BRMS Product and Associated Libraries***

      Change the QSYSOPR message queue to prevent messages not related to the recovery from interrupting the recovery process.

      To do so, type the following command and press "Enter".

CHGMSGQ MSGQ(QSYSOPR) DLVRY(*NOTIFY) SEV(99)

- *Recover the libraries listed below, specifying the saved-item, the name of the standalone device or media library you are using, and the volume identifiers and sequence numbers listed.*

  *For type *FULL, run the following command.*

RSTLIB SAVLIB(saved-item) DEV(device-name)

VOL(volume-identifier) OPTFILE('')

```
Saved      Save    ----- ASP ------  Save     Save             Not    Sequence

Item       Type    Name      Number  Date     Time     Saved   Saved  Number

---------- ------- ---------- ----- -------- -------- -------- ------ ---------

QBRM       *FULL   *SYSBAS    00001  7/06/20 10:37:08     1184      0        48

    OPTFILE('/BRMSOPTSAV2248801200706103706I922BRMC/QBRM ')

QMSE       *FULL   *SYSBAS    00001  7/06/20 10:37:09        8      0        49

    OPTFILE('/BRMSOPTSAV2248801200706103706I922BRMC/QMSE ')

QUSRBRM    *FULL   *SYSBAS    00001  7/06/20 10:37:41      264      0        58

    OPTFILE('/BRMSOPTSAV2248801200706103708I922BRMC/QUSRBRM ')
```

```
                          Restore Library (RSTLIB)

 Type choices, press Enter.

 Saved library  . . . . . . . . . . > QBRM        Name, generic*, *NONSYS...
                + for more values    _________
 Device . . . . . . . . . . . . . . > INSTALL     Name, *SAVF, *MEDDFN
                + for more values    _________
 Volume identifier  . . . . . . . . > Q06990
                + for more values > Q07898
 End of media option  . . . . . .   *REWIND       *REWIND, *LEAVE, *UNLOAD
 Optical file . . . . . . . . . . > '/BRMSOPTSAV2248801200706103706I922BRMC/QBRM
'
```

```
 Selection or command
 ===> RSTLIB SAVLIB(QMSE) DEV(INSTALL) VOL(Q07898) OPTFILE('/BRMSOPTSAV224880120
0706103706I922BRMC/QMSE')
 F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F23=Set initial menu
```

```
 Selection or command
 ===> RSTLIB SAVLIB(QUSRBRM) DEV(INSTALL) VOL(Q08807) OPTFILE('/BRMSOPTSAV224880
1200706103708I922BRMC/QUSRBRM')
 F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F23=Set initial menu
```

6. Follow Step 005 in the BRMS Recovery Report

- ***STEP 005 : Recover BRMS Related Media Information***

  You must recover this information for the BRMS product to accurately guide you through the remaining recovery steps.

  Recover the libraries listed below, specifying the saved-item, the name of the standalone device or media library you are using, and the volume identifiers and sequence numbers listed.

  To do so, type the following command and press "Enter".

RSTOBJ OBJ(*ALL) SAVLIB(saved-item) DEV(device-name)

VOL(volume-identifier) OPTFILE('')

MBROPT(*ALL) ALWOBJDIF(*COMPATIBLE)

```
Saved      Save    ----- ASP ------  Save     Save             Not    Sequence

Item       Type    Name      Number  Date     Time     Saved   Saved  Number

---------- ------- ---------- ----- -------- -------- -------- ------ ---------

QUSRBRM    *QBRM   *SYSBAS    00001  7/06/20 10:37:48       16      0        59
```

```
 Selection or command
 ===> RSTOBJ OBJ(*ALL) SAVLIB(QUSRBRM) DEV(INSTALL) VOL(Q08807) MBROPT(*ALL) ALW
OBJDIF(*COMPATIBLE) OPTFILE('/BRMSOPTSAV22488012007061037 09I922BRMC/QUSRBRM')
 F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F23=Set initial menu
```

7. Follow Step 006 in the BRMS Recovery Report

- ***STEP 006 : Initialize BRMS Functional Authority Information***

INZBRM OPTION(*SETAUT)

SETUSRBRM USER(QSECOFR) USAGE(*ADMIN)

8. *Follow Step 009 in the BRMS Recovery Report*

- ***STEP 009 : Initialize BRMS Device and Media Library Information***

INZBRM OPTION(*DEVICE)

WRKDEVBRM

- Verify your “INSTALL” device is in the list

```
                                Work with Devices                        I922BRMC

 Position to . . . . . .  __________   Starting characters

 Type options, press Enter.
   1=Add    2=Change    4=Remove    5=Display
   8=Work with status

 Opt   Device      Category  Type/Model  Text
  _    __________  ________
  _    INSTALL     *OPT      632B/003    Entry created by BRM configuration
```

9. Follow Step 010 in the BRMS Recovery Report

- ***STEP 010 : Recover User Profiles***

----- Attention ----------

THIS REPORT CONTAINS ITEMS FROM A CLOUD BACKUP.

PLEASE RUN THE FOLLOWING PROGRAM CALL TO SET UP THE CLOUD VOLUMES:

CALL QBRM/Q1AOLD PARM('CLOUD ' 'FIXDRVOL '

'Q06990' 'Q07898' 'Q08807' 'Q13692' 'Q32656')

Note:

You will find your VOLUMES from the BRMS Report file name “QP1A2RCY”

“Recovery Volume Summary Report”

```
 ===> CALL PGM(QBRM/Q1AOLD) PARM('CLOUD      ' 'FIXDRVOL  ' 'Q06990' 'Q07898' 'Q0
8807' 'Q13692' 'Q32656')
 F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F23=Set initial menu
```

- *OR -*

```
                                Call Program (CALL)

 Type choices, press Enter.

 Program  . . . . . . . . . . . . > Q1AOLD       Name
   Library  . . . . . . . . . . . >   QBRM        Name, *LIBL, *CURLIB
 Parameters . . . . . . . . . . . > 'CLOUD      '
_______                           > 'FIXDRVOL   '
_______                           > 'Q06990'
_______                           > 'Q07898'
_______                           > 'Q08807'
_______                           > 'Q13692'
_______                 + for more values > 'Q32656'
_______                                                                Bottom
```

You should restore a current version of your user profiles.

To do so, type the following command and press "Enter".

STRRCYBRM OPTION(*SYSTEM) ACTION(*RESTORE)

----- Attention ----------

Press F9 on the Select Recovery Items display to go to the Restore

Command Defaults display.

__ Ensure the tape device name or media library device name is

correct for the Device prompt.

__ Ensure *SAVLIB is specified for the Restore to library prompt.

__ Ensure *SAVASP is specified for the Auxiliary storage pool prompt.

__ ENSURE *YES IS SPECIFIED FOR THE CREATE PARENT DIRECTORIES PROMPT.

If you are recovering to a different system or a different logical

partition, you must specify the following:

__ *ALL for the Data base member option prompt.

__ *COMPATIBLE for the Allow object differences prompt.

__ *NONE for the System resource management prompt.

Press "Enter" to return to the Select Recovery Items display.

```
                    Start Recovery using BRM (STRRCYBRM)

Type choices, press Enter.

Option . . . . . . . . . . . . . . > *SYSTEM      *SYSTEM, *ALLDLO, *ALLUSR...
Action . . . . . . . . . . . . . . > *RESTORE     *REPORT, *RESTORE
Time period for recovery:
  Start time and date:
  Beginning time . . . . . . . . .   *AVAIL       Time, *DAYS, *AVAIL
  Beginning date . . . . . . . . .   *BEGIN       Date, *CURRENT, *BEGIN
  End time and date:
  Ending time  . . . . . . . . . .   *AVAIL       Time, *AVAIL
  Ending date  . . . . . . . . . .   *END         Date, *CURRENT, *END
Use save files . . . . . . . . . .   *YES         *YES, *NO
Use TSM  . . . . . . . . . . . . .   *YES         *YES, *NO
ASP device:
  From system  . . . . . . . . . .   *LCL
  Auxiliary storage pool . . . .     *ALL         Name, *ALL
  Objects  . . . . . . . . . . . .   *ALL         *ALL, *LIB, *LNK
                + for more values
```

10. Press F9= Restore Command Defaults and make the following changes

```
                    Restore Command Defaults

Type information, press Enter.

Device  . . . . . . . . . . . .  INSTALL     Name, *MEDCLS

Parallel device resources:
  Minimum resources. . . . . . . .  *SAV      1-32, *NONE, *AVAIL
  Maximum resources. . . . . . . .  *AVAIL    1-32, *AVAIL, *MIN
End of media option . . . . . . . . *REWIND   *REWIND, *LEAVE, *UNLOAD
Option  . . . . . . . . . . . . . . *ALL      *ALL, *NEW, *OLD, *FREE
Data base member option . .  *ALL             *MATCH, *ALL, *NEW, *OLD
Restore spooled file data .  *NEW             *NONE, *NEW
Allow object differences  .  *COMPATIBLE      *NONE, *ALL, *COMPATIBLE,
                                              *AUTL, *FILELVL, *OWNER,
                                              *PGP

                                                                   More...
```

11. Page down once and make the following changes
    - System resource management = *NONE (needs to be when you restore to a different system)

```
                         Restore Command Defaults

Type information, press Enter.

 Restore to library  . . . . . . . . *SAVLIB     Name, *SAVLIB
 Auxiliary storage pool  . . . . . . *SAVASP     Name, *SAVASP, 1-32...
 Document name generation  . . . . . *SAME       *SAME, *NEW
 System resource management          *NONE       *ALL, *NONE, *HDW, *TRA
 Apply journaled changes:
   Restore journal receivers . . . . *YES        *YES, *NO
   Apply option  . . . . . . . . . . *NONE       *NONE, *APPLY, *REMOVE
     Ending date . . . . . . . . . . *CURRENT    Date, *CURRENT
     Ending time . . . . . . . . . . *CURRENT    Time, *CURRENT
 Lotus point-in-time:
   Ending date . . . . . . . . . . . *CURRENT    Date, *CURRENT, *FULL
   Ending time . . . . . . . . . . . *CURRENT    Time, *CURRENT, *FULL
 Create parent directories .          *YES        *NO, *YES
   Parent directories owner  . . . . *PARENT     Name, *PARENT
 Key store file  . . . . . . . . . . *SAV        Name, *SAV, *NONE
   Key store library . . . . . . . . *SAV        Name, *SAV, *NONE
                                                                   More...
```

12. Select Option 1=Select "*SAVSECDTA" and press Enter

```
                          Select Recovery Items                   I922BRMC

                                          Select action  . . . . . : *ALL
                                          Select volume  . . . . . : 
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved        Save     Save    Save   Parallel Volume    File        Expire
Opt Item         Date     Time    Type   Devices  Serial    Sequence    Date
 1  *SAVSECDTA  7/06/20 10:36:12 *FULL            Q06990           45    7/27/20
 _  *SAVCFG     7/06/20 10:36:12 *FULL            Q06990           46    7/27/20
 _  QSYS2       7/06/20 10:37:12 *FULL            Q07898           52    7/27/20
 _  QGPL        7/06/20 10:37:13 *FULL            Q07898 +         53    7/27/20
 _  QUSRSYS     7/06/20 10:37:08 *FULL            Q06990           47    7/27/20
 _  QICC        7/06/20 10:37:12 *FULL            Q07898           50    7/27/20
 _  QUSRICC     7/06/20 10:37:12 *FULL            Q07898           51    7/27/20
 _  QIWS        7/06/20 10:37:13 *FULL            Q08807           55    7/27/20
 _  QSYSDIR     7/06/20 10:37:13 *FULL            Q08807           56    7/27/20
 _  QTCP        7/06/20 10:37:13 *FULL            Q08807           54    7/27/20
 _  QCLDIPL     7/06/20 10:37:39 *FULL            Q08807           57    7/27/20
                                                                          Bottom
```

```
                          Select Recovery Items                    I922BRMC
 ..........................................................................
 : _                      Display Recovery Items                   I922BRMC  :
 :                                                                 17:36:40  :
 :    Remaining items . . . . :              1                              :
 :    Remaining objects . . . :             78                              :
 :    Remaining size  . . . . :        66.0275 M   100.0 %                  :
 :                                                                          :
 : Saved                            Save  Volume                Exp    Objects  :
 : Item          Date       Time    Type  Serial   File Seq     Date    Saved   :
 : *SAVSECDTA    7/06/20 10:36:12   *FULL Q06990          45  7/27/20     78   :
 :                                                                          :
 :                                                                          :
 :                                                                          :
 :                                                                          :
 :                                                                          :
 :                                                                          :
 :                                                                          :
 :                                                                          :
 :                                                                          :
 :  Press ATTN key to cancel recovery after current item completes.         :
 : Waiting for reply to message on message queue QSYSOPR.                  :
 ..........................................................................
```

Note:

If you get a message “Waiting for reply to message on message queue QSYSOPR. Select SysReq and type 6 to display QSYSOPR system messages.

If your asked to Load volume Qxxxxx on INSTALL (C G).

Type C to cancel and to continue with the restore.

```
 F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F23=Set initial menu

 6_
MA*    A                                                          24/003
 PF1   PF2   PF3   PF4   PF5   PF6   Enter  PA1   Attn   Insert  Backt...  NewLi...
 PF7   PF8   PF9   PF10  PF11  PF12  Clear  PA2   SysReq Delete  FldExit   Next...
```

13. Follow Step 011 in the BRMS Recovery Report

- ***STEP 011 : Change QSECOFR User Profile Password***

CHGUSRPRF USRPRF(QSECOFR) PASSWORD(new-password)

14. Follow Step 012 in the BRMS Recovery Report

- ***STEP 012 : Recover Configuration Data***
    - Select Option 1=Select “*SAVCFG” and press Enter

```
                              Select Recovery Items                    I922BRMC

                                                 Select action  . . . . . . : *ALL___
                                                 Select volume  . . . . . . : ______
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved         Save      Save    Save    Parallel Volume    File        Expire
Opt Item          Date      Time    Type    Devices  Serial    Sequence    Date
 1  *SAVCFG      7/06/20 10:36:12 *FULL            Q06990           46     7/27/20
 _  QSYS2        7/06/20 10:37:12 *FULL            Q07898           52     7/27/20
 _  QGPL         7/06/20 10:37:13 *FULL            Q07898 +         53     7/27/20
 _  QUSRSYS      7/06/20 10:37:08 *FULL            Q06990           47     7/27/20
```

15. *Follow Step 013 in the BRMS Recovery Report*

- ***STEP 013 : Recover Required System Libraries***
    - *Select Option 1=Select for all of the "Saved Item" and press Enter*

```
                              Select Recovery Items                    I922BRMC

                                                 Select action  . . . . . . : *ALL___
                                                 Select volume  . . . . . . : ______
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved         Save      Save    Save    Parallel Volume    File        Expire
Opt Item          Date      Time    Type    Devices  Serial    Sequence    Date
 1  QSYS2        7/06/20 10:37:12 *FULL            Q07898           52     7/27/20
 1  QGPL         7/06/20 10:37:13 *FULL            Q07898 +         53     7/27/20
 1  QUSRSYS      7/06/20 10:37:08 *FULL            Q06990           47     7/27/20
 1  QICC         7/06/20 10:37:12 *FULL            Q07898           50     7/27/20
 1  QUSRICC      7/06/20 10:37:12 *FULL            Q07898           51     7/27/20
 1  QIWS         7/06/20 10:37:13 *FULL            Q08807           55     7/27/20
 1  QSYSDIR      7/06/20 10:37:13 *FULL            Q08807           56     7/27/20
 1  QTCP         7/06/20 10:37:13 *FULL            Q08807           54     7/27/20
 1  QCLDIPL      7/06/20 10:37:39 *FULL            Q08807           57     7/27/20

                                                                          Bottom
 F3=Exit   F5=Refresh   F9=Recovery defaults   F11=Object View
 F12=Cancel   F14=Submit to batch   F16=Select
 68 objects restored.  2 objects excluded.
```

```
                          Select Recovery Items                    I922BRMC
 _                      Display Recovery Items                    I922BRMC
                                                                  17:57:35
    Remaining items . . . . :              8
    Remaining objects . . . :          2,511
    Remaining size  . . . . :      4,967.2540 M     98.7 %

 Saved                              Save  Volume                  Exp    Objects
 Item          Date       Time      Type  Serial    File Seq      Date    Saved
 QGPL          7/06/20 10:37:13    *FULL  Q07898 +          53  7/27/20    165
 QUSRSYS       7/06/20 10:37:08    *FULL  Q06990            47  7/27/20   1680
 QICC          7/06/20 10:37:12    *FULL  Q07898            50  7/27/20    108
 QUSRICC       7/06/20 10:37:12    *FULL  Q07898            51  7/27/20     36
 QIWS          7/06/20 10:37:13    *FULL  Q08807            55  7/27/20    138
 QSYSDIR       7/06/20 10:37:13    *FULL  Q08807            56  7/27/20     73
 QTCP          7/06/20 10:37:13    *FULL  Q08807            54  7/27/20    281
 QCLDIPL       7/06/20 10:37:39    *FULL  Q08807            57  7/27/20     30

  Press ATTN key to cancel recovery after current item completes.
```

Work with TCP/IP Interfaces and add Internet Address from TARGET IBM i

Before you began the scratch install on the (TARGET) IBM i VSI, you document all your current network information. You will NOW have to recreate these in order to complete the restore:

1. Work with TCP/IP Interfaces
    - Command CFGTCP
    - Select Option 1= Work with TCP/IP interfaces
    - Select Option 1=Add (enter the IP Address you used to connects to the Cloud Object Storage (COS)

```
                          Work with TCP/IP Interfaces
                                                          System:   I922BRMC
 Type options, press Enter.
   1=Add   2=Change   4=Remove   5=Display   9=Start   10=End

      Internet          Subnet              Line      Line
 Opt  Address           Mask              Description  Type
 1    192.168.142.79
      127.0.0.1         255.0.0.0         *LOOPBACK    *NONE
```

Use the IP Address information you documented from the TARGET IBM i VM created in previous Step "**Install Licensed Internal Code LIC on IBM i PowerVSI Client Server (TARGET) using NFS Network Server**"

Internet address = ip address x.x.x.x

Subnet mask = 255.255.255.x

Line description = use one of the 3 CLOUDINITx line description that was restored or use the same one that was documented

```
                          Display TCP/IP Interface
                                                                System:   I922BRMC
 Internet address . . .
```

```
                              Work with ICC Resources

 Type options, press Enter.
    1=Create    2=Change    4=Delete    5=Display


 Opt Name        Type        Description
  _  __________  __________
  5  TOR1CLD     AWSS3       Cloud Object Storage Toronto 1
```

4. Document the Resource URI

```
_                           Display ICC AWS S3 Resource

 Resource name  . . . . . . . . . :  TOR1CLD
 Resource type  . . . . . . . . . :  AWSS3
 Resource description . . . . . . :  Cloud Object Storage Toronto 1

 Use compression  . . . . . . . . :  *NO
 Use encryption . . . . . . . . . :  *NO

 Bucket . . . . . . . . . . . . . :  brms-bucket-backupvol


 Resource URI . . . . . . . . . . :  s3.us-east.cloud-object-storage.appdomain.clo
ud
```

5. See if you can ping the Resource URI to verify the connection

- *If the ping was successful you have a working network to the Cloud Object Storage.*
- *If the ping was unsuccessful, END the IP Interface and Vary off the Ethernet Line. Change the Ethernet line description to another CMNxx Resource you haven't used yet and try to ping again.*

```
Previous commands and messages:
  ping ('s3.us-east.cloud-object-storage.appdomain.cloud')
    Verifying connection to host system
      s3.us-east.cloud-object-storage.appdomain.cloud at address
      169.63.118.98.
    PING reply 1 from 169.63.118.98 took 18 ms. 256 bytes. TTL 243.
    PING reply 2 from 169.63.118.98 took 18 ms. 256 bytes. TTL 243.
    PING reply 3 from 169.63.118.98 took 18 ms. 256 bytes. TTL 243.
    PING reply 4 from 169.63.118.98 took 18 ms. 256 bytes. TTL 243.
    PING reply 5 from 169.63.118.98 took 18 ms. 256 bytes. TTL 243.
    Round-trip (in milliseconds) min/avg/max = 18/18/18.
    Connection verification statistics: 5 of 5 successful (100 %).
```

6. Create a virtual tape device:

   - **CRTDEVTAP DEVD(TOR1CLDTAP) RSRCNAME(*VRT)**

```
                    Create Device Desc (Tape) (CRTDEVTAP)

Type choices, press Enter.

Device description . . . . . . . > TOR1CLDTAP    Name
Device type  . . . . . . . . . .   *RSRCNAME     *RSRCNAME, EU11, EU16, 2440...
Device model . . . . . . . . . .   *RSRCNAME     *RSRCNAME, 1, 2, 12, A01...
Resource name  . . . . . . . . . > *VRT          Name, *NONE, *VRT...
```

7. Vary on the virtual tape device:
    - **VRYCFG CFGOBJ(TOR1CLDTAP) CFGTYPE(*DEV) STATUS(*ON)**

```
Selection or command
===> VRYCFG CFGOBJ(TOR1CLDTAP) CFGTYPE(*DEV) STATUS(*ON)

F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F13=Information Assistant
F23=Set initial menu
Vary on completed for device TOR1CLDTAP.
```

At this point the recovery, physical media is no longer required, media will be downloaded from the cloud.

Since the system is in restricted state, TCP/IP must be started so BRMS can transfer the media.

----- Attention ----------

If done in a previous step, this is not required to be run again

TCP/IP must be started so BRMS can transfer media required by a recovery from the cloud.

If you wish to continue the recovery in restricted state, run the following commands:

- **STRTCP STRSVR(*NO) STRIFC(*NO) STRPTPPRF(*NO) STRIP6(*YES)**
- **STRTCPIFC INTNETADR('nnn.nnn.nnn.nnn')**

Where 'nnn.nnn.nnn.nnn' is the internet address of the

recovery system. nnn is a decimal number ranging from 0

through 255.

NOTE: Use of restricted state TCP/IP requires that 5770SS1 option 3 was installed when the backups were run.

Otherwise, start all subsystems by running the following commands:

- **STRSBS SBSD(QCTL)**
- **STRTCP**

---

8. *Move volumes from Cloud Object Storage (COS) to the TARGET IBM i VSI Client*
    - **WRKMEDBRM** press Enter
    - Find your volumes from the BRMS Recovery Report

      If you volume has a plus (+) to the right, it is part of a serial set.
    - Select Option 6=Work with serial set

Notice the Location of the volumes, they should still be in the Cloud Object Storage (COS) Location.

```
                                Work With Media
                                                                 System:   I922BRMC
Position to  . . . . .   ______        Starting characters

Type options, press Enter.
  1=Add    2=Change    4=Remove    5=Display    6=Work with serial set    7=Expire
  8=Move    9=Remove volume error status      10=Reinitialize ...

     Volume            Creation Expiration            Move      Media       Dup
Opt  Serial     Status   Date      Date     Location   Date      Class       Sts
__   ______
__   Q09148      *EXP  07/06/20  *NONE     *HOME      *NONE     QCLDVRTTAP
__   Q10030 +    *ACT  06/25/20  07/16/20  TOR1CLD    06/25/20  QCLDVRTOPT
__   Q10057      *EXP  07/06/20  *NONE     *HOME      *NONE     QCLDVRTTAP
__   Q10966      *EXP  07/06/20  *NONE     *HOME      *NONE     QCLDVRTTAP
__   Q11874      *EXP  07/06/20  *NONE     *HOME      *NONE     QCLDVRTTAP
__   Q12783      *EXP  07/06/20  *NONE     *HOME      *NONE     QCLDVRTTAP
6_   Q13692 +    *ACT  07/06/20  07/27/20  TOR1CLD    07/09/20  QCLDVRTTAP
                                                                          More...
```

9. Select Option 8=Move (all the volumes at the same time) press Enter

```
                                Work with Serial Set
                                                                   System:   I922BRMC
Type options, press Enter.
  2=Change    5=Display    7=Expire    8=Move    9=Remove volume error status
  10=Reinitialize          11=Mark for label print

     Volume   Volume          Expiration                Move      Media       Dup
Opt  Serial     Seq   Status     Date     Location      Date      Class       Sts
__   ______
8_   Q13692    0001    *ACT    07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
8_   Q32656    0002    *ACT    07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
8_   Q15277    0003    *ACT    07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
8_   Q31632    0004    *ACT    07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
```

10. Change the Storage location to *HOME and press Enter

```
                                   Move Media

Type storage location or container to receive volumes.

  Storage location . .    *HOME_____     *SAME, F4 for list
  Container  . . . . .    *SAME_____     *SAME, *NONE, F4 for list
  Exempt from movement    *SAME___       *SAME, 0 - 9999

     Volume            Creation Expiration                Move      Media       Dup
Opt  Serial    Status    Date      Date      Location     Date      Class       Sts
8    Q13692 +   *ACT   07/06/20  07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
8    Q32656 +   *ACT   07/06/20  07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
8    Q15277 +   *ACT   07/06/20  07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
8    Q31632 +   *ACT   07/06/20  07/27/20   TOR1CLD     07/09/20  QCLDVRTTAP
```

11. Check the ICC Status transfer
    - WRKSTSICC STATUS(*ALL)
    - Check Status is “Active”
    - Oper = FRMCLD (From Cloud)
    - Once all the jobs have a Status of Success, you can continue with the BRMS restore

WRKSTSICC STATUS(*ALL)

```
                              Work with ICC Status                        I922BRMC

Type options, press Enter.
   4=End

                      --------- Job --------------                       Graphic% /
Opt File name/Time  Name       User       Number Status      Oper        Complete%
__  QBRMS_I922BRMC/Q31632                                                **********
     07/09/20 11:01 L000000215 QSECOFR    000521 Success     FRMCLD           100
__  QBRMS_I922BRMC/Q13692                                                ****3
     07/09/20 16:33 L000000216 QSECOFR    000528 Active      FRMCLD            43
__  QBRMS_I922BRMC/Q32656                                                ****3
     07/09/20 16:33 L000000217 QSECOFR    000529 Active      FRMCLD            43
__  QBRMS_I922BRMC/Q15277                                                ****3
     07/09/20 16:33 L000000218 QSECOFR    000530 Active      FRMCLD            43
__  QBRMS_I922BRMC/Q31632                                                ******8
     07/09/20 16:33 L000000219 QSECOFR    000531 Active      FRMCLD            68
                                                                            Bottom
```

12. Follow Step 014 in the BRMS Recovery Report
    - ***STEP 014 : Reset BRMS Device and Media Library Information***
    - ***INZBRM OPTION(*DEVICE)***
    - ***WRKDEVBRM***
    - *You should see Virtual Tape Device "TOR1CLDTAP *VRTTAP"*

```
                              Work with Devices                           I922BRMC

Position to . . . . . .  __________   Starting characters

Type options, press Enter.
  1=Add    2=Change    4=Remove    5=Display
  8=Work with status

Opt   Device       Category  Type/Model  Text
 _    __________   ________
 _    INSTALL      *OPT      632B/003    Entry created by BRM configuration
 _    TOR1CLDTAP   *VRTTAP   63B0/001    Entry created by BRM configuration
```

Recover IBM Product Libraries on the IBM i Power VSI Client Server (TARGET) using Cloud Object Storage (COS)

1. Follow Step 017 in the BRMS Recovery Report

- ***STEP 017 : Recover IBM Product Libraries***

  STRRCYBRM OPTION(*IBM) ACTION(*RESTORE)

The Restore Command Defaults should be used to specify the correct Device parameter and change the Create parent directories prompt back to *NO.

----- Attention ----------

Press F9 on the Select Recovery Items display to go to the Restore

Command Defaults display.

__ Ensure *MEDCLS is specified for the Device prompt.

__ Ensure *NO is specified for the Create parent directories prompt.

Press "Enter" to return to the Select Recovery Items display.

---

2. Review the list of Recovery Items and Remove any that have already been restored.
   - Select Option 4=Remove and press Enter
     - You can also see that the “Volume Serial” is from the optical media
     - Once you remove the items, they will drop off the list

```
                              Select Recovery Items                    I922BRMC

                                                 Select action  . . . . . : *ALL
                                                 Select volume  . . . . . : _____
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved          Save      Save    Save    Parallel Volume    File         Expire
Opt Item           Date      Time    Type    Devices  Serial    Sequence     Date
 4  QICC          7/06/20 10:37:12 *FULL            Q07898          50      7/27/20
 4  QUSRICC       7/06/20 10:37:12 *FULL            Q07898          51      7/27/20
 4  QIWS          7/06/20 10:37:13 *FULL            Q08807          55      7/27/20
 4  QSYSDIR       7/06/20 10:37:13 *FULL            Q08807          56      7/27/20
 4  QTCP          7/06/20 10:37:13 *FULL            Q08807          54      7/27/20
 _  #CGULIB       7/06/20  9:23:31 *FULL            Q13692           1      7/27/20
 _  #COBLIB       7/06/20  9:23:31 *FULL            Q13692           2      7/27/20
 _  #DFULIB       7/06/20  9:23:32 *FULL            Q13692           3      7/27/20
 _  #DSULIB       7/06/20  9:23:32 *FULL            Q13692           4      7/27/20
 _  #RPGLIB       7/06/20  9:23:32 *FULL            Q13692           5      7/27/20
 _  #SDALIB       7/06/20  9:23:33 *FULL            Q13692           6      7/27/20
                                                                            More...
 F3=Exit   F5=Refresh   F9=Recovery defaults   F11=Object View
 F12=Cancel   F14=Submit to batch   F16=Select
```

3. Change the Recovery Defaults
    - Select F9=Recovery defaults
    - Device = TOR1CLDTAP
    - Option = *ALL
    - Data base member option = *ALL
    - Restore spooled file data = *NEW
    - Allow object differences = *COMPATIBLE

```
                         Restore Command Defaults

Type information, press Enter.

 Device  . . . . . . . . . . . . TOR1CLDTAP  Name, *MEDCLS
                                 __________
                                 __________
                                 __________

 Parallel device resources:
   Minimum resources. . . . . . . . *SAV      1-32, *NONE, *AVAIL
   Maximum resources. . . . . . . . _____     1-32, *AVAIL, *MIN
 End of media option . . . . . . . . *REWIND  *REWIND, *LEAVE, *UNLOAD
 Option  . . . . . . . . . . . . . . *ALL     *ALL, *NEW, *OLD, *FREE
 Data base member option . . . . . . *ALL     *MATCH, *ALL, *NEW, *OLD
 Restore spooled file data . . . . . *NEW     *NONE, *NEW
 Allow object differences  . . . . . *COMPATIBLE *NONE, *ALL, *COMPATIBLE,
                                 __________   *AUTL, *FILELVL, *OWNER,
                                 __________   *PGP
                                 __________
```

4. Page down
    - System resource management = *NONE
    - Create parent directories = *NO

- Press Enter to return to “Select Recovery Items”

```
                         Restore Command Defaults

Type information, press Enter.

 Restore to library  . . . . . . . . . *SAVLIB     Name, *SAVLIB
 Auxiliary storage pool  . . . . . . . *SAVASP     Name, *SAVASP, 1-32...
 Document name generation  . . . . . . *SAME       *SAME, *NEW
 System resource management  . . . . . *NONE       *ALL, *NONE, *HDW, *TRA
 Apply journaled changes:
   Restore journal receivers . . . . . *YES        *YES, *NO
   Apply option  . . . . . . . . . . . *NONE       *NONE, *APPLY, *REMOVE
     Ending date . . . . . . . . . . . *CURRENT    Date, *CURRENT
     Ending time . . . . . . . . . . . *CURRENT    Time, *CURRENT
 Lotus point-in-time:
   Ending date . . . . . . . . . . . . *CURRENT    Date, *CURRENT, *FULL
   Ending time . . . . . . . . . . . . *CURRENT    Time, *CURRENT, *FULL
 Create parent directories . . . . . . *NO         *NO, *YES
   Parent directories owner  . . . . . *PARENT     Name, *PARENT
 Key store file  . . . . . . . . . . . *SAV        Name, *SAV, *NONE
   Key store library . . . . . . . . . *SAV        Name, *SAV, *NONE
```

5. Select the saved items
   - Review the list again
   - Select Option 1=Select for each item

     or
   - Select F16= Select (this will select all the items for you)
   - Press Enter to recover the saved items

```
                                        Select action  . . . . . : *ALL
                                        Select volume  . . . . . : _______
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved        Save     Save    Save    Parallel Volume    File        Expire
Opt Item         Date     Time    Type    Devices  Serial    Sequence    Date
 1  #CGULIB     7/06/20  9:23:31 *FULL            Q13692            1     7/27/20
 1  #COBLIB     7/06/20  9:23:31 *FULL            Q13692            2     7/27/20
 1  #DFULIB     7/06/20  9:23:32 *FULL            Q13692            3     7/27/20
 1  #DSULIB     7/06/20  9:23:32 *FULL            Q13692            4     7/27/20
 1  #RPGLIB     7/06/20  9:23:32 *FULL            Q13692            5     7/27/20
 1  #SDALIB     7/06/20  9:23:33 *FULL            Q13692            6     7/27/20
 1  #SEULIB     7/06/20  9:23:33 *FULL            Q13692            7     7/27/20
 1  QADVSEC     7/06/20  9:23:34 *FULL            Q13692            8     7/27/20
 1  QAFPLIB1    7/06/20  9:23:34 *FULL            Q13692            9     7/27/20
 1  QAFPLIB2    7/06/20  9:23:34 *FULL            Q13692           10     7/27/20
 1  QAFPLIB3    7/06/20  9:23:34 *FULL            Q13692           11     7/27/20
                                                                          More...
 F3=Exit   F5=Refresh   F9=Recovery defaults   F11=Object View
 F12=Cancel   F14=Submit to batch   F16=Select

MA*   A                    MW                                          10/002
PF13  PF14  PF15  PF16  PF17  PF18  Enter  Rule   EndFld  ErInp  Reset  DUP ...
PF19  PF20  PF21  PF22  PF23  PF24  Clear  AltCur  ErFld   ErEOF  Next...
```

```
: _                        Display Recovery Items                    I922BRMC  :
:                                                                    22:00:05  :
:    Remaining items . . . . :            114                                :
:    Remaining objects . . . :         96,133                                :
:    Remaining size  . . . . :     6,911.6764 M    99.4 %                    :
:                                                                            :
: Saved                            Save  Volume                 Exp    Objects  :
: Item         Date      Time     Type  Serial   File Seq      Date    Saved   :
: QCAEXP       7/06/20  9:23:37  *FULL Q13692           15  7/27/20      9   :
: QCA400W      7/06/20  9:23:37  *FULL Q13692           16  7/27/20     11   :
: QCBL         7/06/20  9:23:37  *FULL Q13692           17  7/27/20     74   :
: QCBLLE       7/06/20  9:23:37  *FULL Q13692           18  7/27/20      9   :
: QCBLLEP      7/06/20  9:23:37  *FULL Q13692           19  7/27/20      7   :
: QCCA         7/06/20  9:23:37  *FULL Q13692           20  7/27/20    179   :
: QCICS        7/06/20  9:23:37  *FULL Q13692           21  7/27/20    503   :
: QCICSSAMP    7/06/20  9:23:38  *FULL Q13692           22  7/27/20     74   :
:                                   Continued                                :
:                                                                            :
:  Press ATTN key to cancel recovery after current item completes.           :
: Restoring library QCAEXP from volume Q13692 sequence number 15.            :
:............................................................................:
```

Recover User Libraries on the IBM i Power VSI Client Server (TARGET) using Cloud Object Storage (COS)

1. Follow Step 018 in the BRMS Recovery Report

- ***STEP 018 : Recover User Libraries***

STRRCYBRM OPTION(*ALLUSR) ACTION(*RESTORE)

2. Review the list of Recovery Items and Remove any that have already been restored.
    - Select Option 4=Remove and press Enter
        - You can also see that the "Volume Serial" is from the optical media
        - Press F11=Object View (will show you which Control Group created the saved item)
        - Remove items created by "QCLDBIPL01"
        - Once you remove the items, they will drop off the list

```
                                                Select action  . . . . . : *ALL
                                                Select volume  . . . . . : _____
 Type options, press Enter.
   1=Select    4=Remove    5=Display    7=Specify object

     Saved          Save      Save    Item        ----- Objects ----  Control
Opt  Item           Date      Time    Type        Saved     Not Saved Group    Encrypted
 _   QS36F         7/06/20   9:25:14 *LIB              1          0 QCLDBSYS01
 _   QUSRDIRCF     7/06/20   9:25:14 *LIB              3          0 QCLDBSYS01
 _   QUSRDIRDB     7/06/20   9:25:14 *LIB            191          0 QCLDBSYS01
 _   QUSRIJS       7/06/20   9:25:14 *LIB            104          0 QCLDBSYS01
 _   SYSIBM        7/06/20   9:25:16 *LIB             66          0 QCLDBSYS01
 _   SYSIBMADM     7/06/20   9:25:16 *LIB             17          0 QCLDBSYS01
 _   SYSPROC       7/06/20   9:25:16 *LIB              3          0 QCLDBSYS01
 _   SYSTOOLS      7/06/20   9:25:16 *LIB             60          0 QCLDBSYS01
 4   QUSRSYS       7/06/20  10:37:08 *LIB           1680          0 QCLDBIPL01
 4   QSYS2         7/06/20  10:37:12 *LIB            343          0 QCLDBIPL01
 4   QGPL          7/06/20  10:37:13 *LIB            165          0 QCLDBIPL01
                                                                              Bottom
```

3. Select the saved items
    - Review the list again
    - Select Option 1=Select for each item

      or
    - Select F16= Select (this will select all the items for you)
    - Press Enter to recover the saved items

```
                                                Select action  . . . . . : *ALL
                                                Select volume  . . . . . : _____
 Type options, press Enter.
   1=Select    4=Remove    5=Display    7=Specify object

     Saved          Save      Save    Save    Parallel Volume    File        Expire
Opt  Item           Date      Time    Type    Devices  Serial    Sequence    Date
 1   #LIBRARY      7/06/20   9:25:10 *FULL             Q13692          136    7/27/20
 1   CESARLIB      7/06/20   9:25:10 *FULL             Q13692          137    7/27/20
 1   CESARLIBBK    7/06/20   9:25:11 *FULL             Q13692          138    7/27/20
 1   CESAROBJ      7/06/20   9:25:11 *FULL             Q13692          139    7/27/20
 1   CLDLIB        7/06/20   9:25:11 *FULL             Q13692          140    7/27/20
 1   CLDTSTCS1     7/06/20   9:25:12 *FULL             Q13692          141    7/27/20
 1   QDSNX         7/06/20   9:25:12 *FULL             Q13692          142    7/27/20
 1   QMGTC         7/06/20   9:25:13 *FULL             Q32656          144    7/27/20
 1   QMGTC2        7/06/20   9:25:13 *FULL             Q32656          145    7/27/20
 1   QRCL          7/06/20   9:25:13 *FULL             Q32656          146    7/27/20
 1   QSRVAGT       7/06/20   9:25:13 *FULL             Q32656          147    7/27/20
                                                                              More...
 F3=Exit    F5=Refresh    F9=Recovery defaults    F11=Object View
 F12=Cancel    F14=Submit to batch    F16=Select

MA*    A                    MW                                                10/002
PF13  PF14  PF15  PF16  PF17  PF18  Enter  Rule   EndFld  ErInp  Reset  DUP ...
PF19  PF20  PF21  PF22  PF23  PF24  Clear  AltCur  ErFld   ErEOF  Next...
```

```
: _                        Display Recovery Items                    I922BRMC  :
:                                                                    22:20:32  :
:    Remaining items . . . . :              6                                  :
:    Remaining objects . . . :            441                                  :
:    Remaining size  . . . . :        51.0239 M    60.8 %                     :
:                                                                              :
: Saved                            Save  Volume                Exp    Objects  :
: Item         Date      Time     Type  Serial   File Seq     Date    Saved   :
: QUSRDIRDB    7/06/20  9:25:14  *FULL Q32656          151  7/27/20    191   :
: QUSRIJS      7/06/20  9:25:14  *FULL Q32656          152  7/27/20    104   :
: SYSIBM       7/06/20  9:25:16  *FULL Q32656          154  7/27/20     66   :
: SYSIBMADM    7/06/20  9:25:16  *FULL Q32656          155  7/27/20     17   :
: SYSPROC      7/06/20  9:25:16  *FULL Q32656          156  7/27/20      3   :
: SYSTOOLS     7/06/20  9:25:16  *FULL Q32656          157  7/27/20     60   :
:                                                                              :
:                                                                              :
:                                                                              :
:                                                                              :
:  Press ATTN key to cancel recovery after current item completes.             :
:                                                                              :
:..............................................................................:
```

Recover Document Library Objects on the IBM i Power VSI Client Server (TARGET) using Cloud Object Storage (COS)

1. Follow Step 019 in the BRMS Recovery Report

- ***STEP 019 : Recover Document Library Objects***

  STRRCYBRM OPTION(*ALLDLO) ACTION(*RESTORE)

2. Select the saved item
   - Select Option 1=Select
   - Press Enter to recover the saved items

```
                                        Select action  . . . . . . : *ALL
                                        Select volume  . . . . . . : ______
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved        Save     Save   Save   Parallel Volume    File        Expire
Opt Item         Date     Time   Type   Devices  Serial    Sequence    Date
 1  *ALLDLO      7/06/20  9:25:34 *FULL           Q32656          159    7/27/20
```

Recover Directories and Files on the IBM i Power VSI Client Server (TARGET) using Cloud Object Storage (COS)

1. Follow Step 020 in the BRMS Recovery Report

- ***STEP 020 : Recover Directories and Files***

  STRRCYBRM OPTION(*LNKLIST) ACTION(*RESTORE)

2. Review the list of Recovery Items and Remove any that have already been restored.
   - Select Option 4=Remove and press Enter
     - You can also see that the "Volume Serial" is from the optical media
     - Press F11=Object View (will show you which Control Group created the saved item)
     - Remove items created by "QCLDBIPL01"
     - Once you remove the items, they will drop off the list

```
                                          Select action  . . . . . : *ALL
                                          Select volume  . . . . . : _____
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved        Save     Save   Item       ----- Objects ----  Control
Opt Item         Date     Time   Type       Saved    Not Saved  Group    Encrypted
 4  QCLDIPL     7/06/20 10:37:39 *LNK            30          0  QCLDBIPL01
 _  *LINK       7/06/20  9:25:35 *LNK        185918          0  QCLDBSYS01
 _  *LINK       7/06/20  9:25:35 *LNK             1          0  QCLDBSYS01
```

2. Select the saved items
   - Select Option 1=Select
   - Press Enter to recover the saved items

```
                                          Select action  . . . . . : *ALL
                                          Select volume  . . . . . : _____
 Type options, press Enter.
   1=Select   4=Remove   5=Display   7=Specify object

    Saved        Save     Save   Save   Parallel Volume    File        Expire
Opt Item         Date     Time   Type   Devices  Serial    Sequence    Date
 1  *LINK       7/06/20  9:25:35 *FULL           Q32656 +        160     7/27/20
 1  *LINK       7/06/20  9:25:35 *FULL           Q32656 +        160     7/27/20
```

3. You can see the progress of the “processing objects” and “completed objects” as they get restored

```
 _                        Display Recovery Items                    I922BRMC
                                                                    22:36:21
    Remaining items . . . . :              2
    Remaining objects . . . :        185,919
    Remaining size  . . . . :    23,721.8734 M   100.0 %

 Saved                            Save  Volume                 Exp     Objects
 Item          Date       Time    Type  Serial   File Seq      Date     Saved
 *LINK         7/06/20  9:25:35  *FULL Q32656 +        160   7/27/20 185918
 *LINK         7/06/20  9:25:35  *FULL Q32656 +        160   7/27/20      1

  Press ATTN key to cancel recovery after current item completes.
 Started processing 9000 objects, completed 2000 objects.
```

Complete Final Steps in BRMS on the IBM i Power VSI Client Server (TARGET)

1. Follow Step 025 in the BRMS Recovery Report

- ***STEP 025 : Update Program Temporary Fix Information***

  UPDPTFINF

2. Follow Step 026 in the BRMS Recovery Report

- ***STEP 026 : Recover Authorization Information***

  RSTAUT USRPRF(*ALL)

```
                         Restore Authority (RSTAUT)

Type choices, press Enter.

User profile . . . . . . . . . .   *ALL        Name, generic*, *ALL
               + for more values   __________

F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cance
F13=How to use this display        F24=More keys
Authorities processed for 3 of 65 user profiles.
```

3. Follow Step 027 in the BRMS Recovery Report

- ***STEP 027 : Verify System Information***
- ***This will restore your System Values***

UPDSYSINF LIB(QUSRSYS) TYPE(*SYSVAL)

```
                     Update System Information (UPDSYSINF)

Type choices, press Enter.

Library  . . . . . . . . . . . . . > QUSRSYS     Name
Type of information  . . . . . . . > *SYSVAL     *ALL, *EDTD, *NETA, *RPYLE...
```

4. Follow Step 030 in the BRMS Recovery Report

- ***STEP 030 : Print Job Log***

DSPJOBLOG JOB(*) OUTPUT(*PRINT)

5. Change IPL Attributes
   - **CHGIPLA**

- **Start to restricted state = *YES**
  - After the IPL you can verify the system

- Check network, software license keys, etc..

```
                        Change IPL Attributes (CHGIPLA)

Type choices, press Enter.

Restart type . . . . . . . . . . .   *SYS          *SAME, *SYS, *FULL
Keylock position . . . . . . . . .   *SAME         *SAME, *NORMAL, *AUTO...
Hardware diagnostics . . . . . . .   *MIN          *SAME, *MIN, *ALL
Compress job tables  . . . . . . .   *NONE         *SAME, *NONE, *NEXT...
Check job tables . . . . . . . . .   *ABNORMAL     *SAME, *ABNORMAL, *ALL, *SYNC
Rebuild product directory  . . .     *NONE         *SAME, *NONE, *NORMAL...
Mail Server Framework recovery       *NONE         *SAME, *NONE, *ABNORMAL
Display status . . . . . . . . . .   *ALL          *SAME, *SYS, *NONE...
Start TCP/IP . . . . . . . . . . .   *YES          *SAME, *YES, *NO
Spooled file recovery  . . . . .     *DETACH       *SAME, *DETACH, *REMOVE
Clear job queues . . . . . . . . .   *NO           *SAME, *YES, *NO
Clear output queues  . . . . . . .   *NO           *SAME, *YES, *NO
Clear incomplete joblogs . . . .     *NO           *SAME, *YES, *NO
Start print writers  . . . . . .     *YES          *SAME, *YES, *NO, *NONE
Start to restricted state  .         *YES          *SAME, *YES, *NO
```

6. Change System Value for QIPLTYPE
   - WRKSYSVAL QIPLTYPE
   - Select Option 2=Change

```
                           Work with System Values
                                                          System:   I922BRMC
Position to  . . . . . .   __________   Starting characters of system value
Subset by Type . . . . .   _______      F4 for list

Type options, press Enter.
  2=Change    5=Display

        System
Option  Value       Type      Description
  2     QIPLTYPE    *SYSCTL   Type of IPL to perform
```

7. Select 0=Unattended IPL

```
                             Change System Value

System value . . . . . :   QIPLTYPE
Description  . . . . . :   Type of IPL to perform


Type choice, press Enter.

  Type of IPL  . . . . .   0          0=Unattended IPL
                                      1=Attended IPL with dedicated service
                                        tools
                                      2=Attended IPL, console in debug mode
```

8. Follow Step 031 in the BRMS Recovery Report

- ***STEP 031 : Perform IPL***

  PWRDWNSYS OPTION(*IMMED) RESTART(*YES)

  Press F16=Confirm

9. At the IPL or Install the System Menu
- Select Option 3=Use Dedicated Service Tools (DST)

```
                         IPL or Install the System
                                                          System:   TARGET
Select one of the following:

     1. Perform an IPL
     2. Install the operating system
     3. Use Dedicated Service Tools (DST)
     4. Perform automatic installation of the operating system
     5. Save Licensed Internal Code




Selection
     3

Licensed Internal Code - Property of IBM 5770-999 Licensed
Internal Code (c) Copyright IBM Corp.  1980, 2015.  All
rights reserved.  US Government Users Restricted Rights -
Use duplication or disclosure restricted by GSA ADP schedule
Contract with IBM Corp.
```

10. Sign On to Dedicated Service Tools (DST)

```
                    Dedicated Service Tools (DST) Sign On
                                                          System:   TARGET
Type choices, press Enter.

  Service tools user . . . . . . . . . . .   qsecofr
  Service tools password . . . . . . . . .          _

F3=Exit   F5=Change password   F12=Cancel
```

11. Select Option 7=Start a service tool

```
                      Use Dedicated Service Tools (DST)
                                                          System:   TARGET
Select one of the following:

     1. Perform an IPL
     2. Install the operating system
     3. Work with Licensed Internal Code
     4. Work with disk units
     5. Work with DST environment
     6. Select DST console mode
     7. Start a service tool
     8. Perform automatic installation of the operating system

    10. Work with remote service support

    13. Work with system security
    14. End batch restricted state


Selection
     7

F3=Exit   F12=Cancel
```

12. Select Option 7=Operator panel functions

```
                              Start a Service Tool
                                                                 System:   TARGET
Attention: Incorrect use of this service tool can cause damage
to data in this system.  Contact your service representative
for assistance.

Select one of the following:

     1. Display/Alter/Dump
     2. Licensed Internal Code log
     3. Trace Licensed Internal code
     4. Hardware service manager
     5. Main storage dump manager
     6. Product activity log
     7. Operator panel functions
     8. Performance data collector



Selection
     7_

F3=Exit   F12=Cancel
```

13. IPL mode:
    - Select Option 2=Normal
    - Press F8 to set the IPL attributes and restart the system

```
                    Operator Panel Functions
                                                          System:   TARGET
 IPL source:  2   (1=A, 2=B or 3=D)
 IPL mode:    2   (1=Manual, 2=Normal, 3=Secure or 4=Auto)

 Press Enter to change the IPL attributes and return
   to the main DST menu.
 Press F8 to set the IPL attributes and restart the system.
   Machine processing will be ended and the system will be
   restarted.
 Press F10 to set the IPL attributes and power off the system.
   Machine processing will be ended and the system will be
   powered off.
 Press F12 to return to the main DST menu without changing
   IPL attributes.

 F3=Exit   F8=Restart   F10=Power off   F12=Cancel
```

14. Press Enter to confirm

```
                        Confirm System Reset
                                                          System:   TARGET
 Press Enter to confirm the reset of the system.
 Press F3 or F12 to cancel and return to the main DST menu.
```

15. Your System will IPL to a Sign On Screen

```
                                Sign On
                                          System  . . . . . :   TARGET
                                          Subsystem . . . . :   QCTL
                                          Display . . . . . :   DSP01

              User  . . . . . . . . . . . . . .   _________
              Password  . . . . . . . . . . . .

              Program/procedure . . . . . . . .   __________
              Menu  . . . . . . . . . . . . . .   __________
              Current library . . . . . . . . .   __________
```

Object-level Backups

Automatic Transfers of Media to Cloud Storage

Control groups that have a QCLD prefix will cause BRMS to automatically create and transfer media to the cloud during a backups.

NOTES:

1. The automatic transfer will begin after the first volume switch if the save spans media
2. Using SAVxxxBRM commands will not trigger the automatic transfer of media.
3. When using virtual optical media, the automatic transfer will only start once the save job is completed.

BRMS control groups for automatic transfers to the cloud - QCLDBxxxxx

Control groups that have a QCLDB prefix are created by BRMS for each cloud resource defined on the system. The QCLDB control groups should not be changed by the user but users can tailor control groups that will automatically transfer media to the cloud, see section **User control groups for automatic transfers to the cloud - QCLDUxxxxx** below for more information.

Note: When using IBM Cloud Storage Solutions for i V1.2.0, a full system backup requires that the data from QCLDBIPLnn and QCLDBGRPnn control groups are backed up using a cloud connector resource that does not use encryption and/or compression. To use cloud connector resources with encryption and/or compression for a full system save scenario, you must create two different sets of cloud connectors to the same resource. One control group pair using compression and/or encryption and another pair using neither compression nor encryption to back up all the system data needed for a Disaster Recovery.

The control groups QCLDBSYSnn and QCLDBUSRnn can be backed up with a cloud connector resource using any configuration.

The following control groups will be created by BRMS:

- QCLDBIPLxx - Used to do SAVSYS and full backups of system and user objects to media that will be transferred to the cloud but must be burned to optical media before use during recovery. This group is not created for cloud connectors using compression or encryption.
- QCLDBGRPxx - Used to do cumulative incremental backups of system and user objects to media that will be transferred to the cloud but must be burned to optical media before use during recovery. This group is not created for cloud connectors using compression or encryption.
- QCLDBSYSxx - Used to do full backups of system and user objects that can be restored from cloud media without burning the cloud media to physical optical media.
- QCLDBUSRxx - Used to do cumulative incremental backups of system and user objects that can be restored from cloud media without burning the cloud media to physical optical media.

where xx is a unique number for each cloud resource.

NOTES:

1. Control groups that have a QCLDB prefix cannot be deleted. QCLDBxxxxx control groups should not be changed by the user.
2. QCLDBIPLxx and QCLDBGRPxx BRMS control groups only work for basic cloud connectors. These groups cannot be used with cloud connectors created using IBM Cloud Storage Solutions for i V1.2.0 with compression or encryption.

3. Do not copy the QCLDBIPLxx and QCLDBGRPxx control groups and modify the copies to use encryption or compression connectors. They will not work in a Disaster Recovery scenario.

User control groups for automatic transfers to the cloud - QCLDUxxxxx

QCLDBxxxxx control groups should not be changed by the user. Instead, a QCLDBxxxxx control group can be copied to a QCLDUuuuuu control group, where uuuuu is a user specified suffix, which the user can then change. Since the user's QCLDUuuuuu control group has a QCLD prefix, it will also cause BRMS to automatically create and transfer media to the cloud when it is used to do a backup.

After a QCLDBxxxxx control group has been copied to QCLDUuuuuu, QCLDUuuuuu will be associated with the move policy that was created by BRMS for the cloud resource. The move policy associated with the control group can be changed but the move policy that is used must contain a cloud location at sequence 10 otherwise automatic cloud transfers will not work properly.

Saving a Single Library to Cloud Object Storage (COS)

This scenario will copy a single library and name it (CLDLIB), automatically transfer the media to the cloud and then transfer media back to the system during a restore.

1. Configure BRMS objects required to use the cloud resource:
    - **INZBRM OPTION(*DATA)**
2. The pre-defined cloud control groups that BRMS created for the cloud resource should be setup to work as defined.

```
Position to . . . . . .  __________   Starting characters

Type options, press Enter
  1=Create    2=Edit entries    3=Copy      4=Delete   5=Display
  6=Add to schedule   8=Change attributes   9=Subsystems to process ...
                Full        Incr        Weekly
    Control     Media       Media       Activity
Opt Group       Policy      Policy      SMTWTFS  Text
_   __________
__  *BKUGRP     *BKUPCY     *BKUPCY     *BKUPCY  Backs up all user data
__  *SYSGRP     SAVSYS      SAVSYS      *BKUPCY  Backs up all system data
__  *SYSTEM     SYSTEM      SYSTEM      *BKUPCY  Backs up the entire system
__  QCLDBGRP01  TOR1CLD     TOR1CLD     *BKUPCY  Entry created by BRM configura
__  QCLDBIPL01  TOR1CLD     TOR1CLD     *BKUPCY  Entry created by BRM configura
__  QCLDBSYS01  TOR1CLD     TOR1CLD     *BKUPCY  Entry created by BRM configura
__  QCLDBUSR01  TOR1CLD     TOR1CLD     *BKUPCY  Entry created by BRM configura
```

3. To simplify this example, copy one of the pre-defined control groups:
    - **WRKCTLGBRM TYPE(*BKU)**
        - specify 3=Copy next to QCLDBUSR01
            - specify QCLDUUSR01 for the New Name field

```
To copy control group, type New Name, press enter.

Control                          Remote       Remote
Group          New Name          Location     Network ID     Overwrite
QCLDBUSR01     QCLDUUSR01        *LCL         ___________    *NO
```

4. Copy a library to save to the cloud:
    - **WRKLIB LIB(QUSRTOOL)**
        - Specify 3=Copy next to QUSRTOOL

```
                              Work with Libraries

  Type options, press Enter.
    1=Create   2=Change   3=Copy    4=Delete   5=Display   6=Print
    8=Display library description   9=Save     10=Restore
    11=Save changed objects         12=Work with objects   14=Clear

                                ASP
  Opt  Library     Attribute    Device      Text

  __   __________
  3_   QUSRTOOL    PROD
```

- Specify New library = CLDLIB

```
                              Copy Library (CPYLIB)

 Type choices, press Enter.

 Existing library . . . . . . . . > QUSRTOOL      Name
 New library  . . . . . . . . . . > CLDLIB        Name
 Create library . . . . . . . . .   *YES          *YES, *NO
```

5. Change the entries in the control group to save the library created in the previous step:
   - **WRKCTLGBRM TYPE(*BKU)**
     - specify 2=Change entries next to QCLDUUSR01
       - clear all entries from the control group by removing all the numbers from the Seq column
       - add and entry for library CLDLIB:
         - Seq - 10
         - Backup Items - CLDLIB
         - Retain Object Detail - *OBJ (Object detail is kept in the BRMS backup history). You can still restore objects from the library if *ERR default value is used.

```
                      Edit Backup Control Group Entries                I922BRMC

 Group . . . . . . . . . . . . : QCLDUUSR01
 Default activity  . . . . . . *BKUPCY
 Text  . . . . . . . . . . . . CLDLIB Backup

 Type information, press Enter.

                                   Weekly    Retain Save      SWA
      Backup      List ASP         Activity  Object While     Message     Sync
 Seq  Items       Type Device      SMTWTFS   Detail Active    Queue       ID

 _ 10 CLDLIB                       *DFTACT   *OBJ   *NO
```

   - **WRKCTLGBRM TYPE(*BKU)**
     - specify 8=Change attributes next to QCLDUUSR01
     - Sign off interactive users - *NO

```
                        Change Backup Control Group Attributes

  Group  . . . . . . . . . . . . . . . . . . : QCLDUUSR01

  Type information, press Enter.

  Media policy for:
    Full backups . . . . . . . . . . . . . . TOR1CLD     Name, F4 for list
    Incremental backups  . . . . . . . . . . TOR1CLD     Name, F4 for list
  Backup devices . . . . . . . . . . . . . . *MEDCLS     Name, F4 for list
                                             ___________
                                             ___________
                                             ___________
  Parallel device resources:
    Minimum resources  . . . . . . . . . . . *NONE       1-32, *NONE, *AVAIL
    Maximum resources  . . . . . . . . . . . _________   1-32, *AVAIL, *MIN
  Sign off interactive users . . . . . . . . *NO        *YES, *NO, *BKUPCY
  Sign off limit . . . . . . . . . . . . . . 0          0-999 minutes, *BKUPCY
  Default weekly activity  . . . . . . . . . *BKUPCY    SMTWTFS(F/I), *BKUPCY
  Incremental type . . . . . . . . . . . . . *CUML      *CUML, *INCR, *BKUPCY
  Force full backup days . . . . . . . . . . *NOMAX     0-365, *NOMAX, *BKUPCY
```

- page down once
- Automatically backup media information - *NONE
- Append to media - *NO

```
                        Change Backup Control Group Attributes

  Group  . . . . . . . . . . . . . . . . . . : QCLDUUSR01

  Type information, press Enter.

  Automatically backup
      media information  . . . . . . . . . . *NONE       *LIB, *OBJ, *NONE, *BKUPCY
  Save access paths  . . . . . . . . . . . . *BKUPCY    *YES, *NO, *BKUPCY ...
  Save contents of save files  . . . . . . . *BKUPCY    *YES, *NO, *BKUPCY
  Save spooled file data . . . . . . . . . . *BKUPCY    *NONE, *ALL, *BKUPCY
  Queue data . . . . . . . . . . . . . . . . *BKUPCY    *NONE, *DTAQ, *BKUPCY
  Data compression . . . . . . . . . . . . . *BKUPCY    *DEV, *YES, *NO, *BKUPCY
  Data compaction  . . . . . . . . . . . . . *BKUPCY    *DEV, *NO, *BKUPCY
  Target release . . . . . . . . . . . . . . *BKUPCY    *CURRENT, *PRV, *BKUPCY
  Update history . . . . . . . . . . . . . . *BKUPCY    *YES, *NO, *BKUPCY
  Update history for directories . . . . . . *BKUPCY    *SYS, *NO, *PC, *YES ...
                                             _________
  Clear  . . . . . . . . . . . . . . . . . . *BKUPCY    *NONE, *ALL...
  Object pre-check . . . . . . . . . . . . . *BKUPCY    *YES, *NO, *BKUPCY
  Append to media  . . . . . . . . . . . . . *NO        *YES, *NO, *BKUPCY
                                                                     More...
```

- page down once again
- IPL after backup - *NO

```
                         Change Backup Control Group Attributes

   Group  . . . . . . . . . . . . . . . . . . : QCLDUUSR01

   Type information, press Enter.

   End of media option  . . . . . . . . . . . *BKUPCY      *UNLOAD, *REWIND...
   Journaled objects  . . . . . . . . . . . . *YES         *YES, *NO, *BKUPCY
   Use optimum block size . . . . . . . . . . *BKUPCY      *BKUPCY, *DEV, *YES, *NO
   IPL after backup . . . . . . . . . . . . . *NO          *YES, *NO, *BKUPCY
      How to end  . . . . . . . . . . . . . . *BKUPCY      *CNTRLD, *IMMED, *BKUPCY
      Delay time, if *CNTRLD  . . . . . . . . *BKUPCY      Seconds, *NOLIMIT
      Restart after power down  . . . . . . . *BKUPCY      *YES, *NO, *BKUPCY
      IPL source  . . . . . . . . . . . . . . *BKUPCY      *PANEL, A, B, *BKUPCY
      IPL restart type  . . . . . . . . . . . *IPLA        *FULL, *IPLA, *SYS ...
   Save active wait time:
      Object locks  . . . . . . . . . . . . . 120          0-99999, *NOMAX
      Pending record changes  . . . . . . . . 120          0-99999, *NOCMTBDY, *NOMAX
      Other pending changes . . . . . . . . . 120          0-99999, *NOMAX
```

6. Run the control group:
   - **STRBKUBRM CTLGRP(QCLDUUSR01) SBMJOB(*NO)**
7. View the media to verify that it is at the cloud location:
   - **WRKMEDBRM FILEGRP(QCLDUUSR01)**
     - verify the volume is in *ACT status
     - verify the location is the cloud resource created in step 1

```
     Volume                Creation Expiration                Move      Media      Dup
Opt  Serial     Status      Date      Date      Location       Date      Class      Sts

_    Q21041      *ACT     06/01/20  06/22/20   TOR1CLD       06/01/20  QCLDVRTTAP
```

8. Delete the library:
   - **DLTLIB LIB(CLDLIB)**
9. Restore the library:
   - **WRKMEDIBRM CTLGRP(QCLDUUSR01)**
     - specify 7=Restore next to the saved item
       - specify 1=Select next to the saved item

```
Type options, press Enter.
  2=Change    4=Remove    5=Display    6=Work with media    7=Restore
  9=Work with saved objects    ...

   Saved          Save      Save    Save    Parallel Volume     File        Expire
Opt Item          Date      Time    Type    Devices  Serial     Sequence    Date
 7_ CLDLIB       6/01/20 21:53:04 *FULL             Q21041             1     6/22/20
```

```
Type options, press Enter.
  1=Select    4=Remove    5=Display    7=Specify object

   Saved          Save      Save    Save    Parallel Volume     File        Expire
Opt Item          Date      Time    Type    Devices  Serial     Sequence    Date
 1  CLDLIB       6/01/20 21:53:04 *FULL             Q21041             1     6/22/20
```

10. Verify that the library was restored:

    - **DSPLIB LIB(CLDLIB)**

```
                                Display Library

   Library  . . . . . . . :   CLDLIB          Number of objects  . :   23
   Type . . . . . . . . . :   PROD            Library ASP number . :   1
   Create authority . . :   *CHANGE          Library ASP device . :   *SYSBAS
                                             Library ASP group  . :   *SYSBAS

   Type options, press Enter.
     5=Display full attributes   8=Display service attributes

   Opt  Object      Type      Attribute                Size  Text
    _   PACKAGE     *PGM      CLP                    180224
    _   QTTEXIT1    *PGM      CLP                     65536
    _   QTTEXIT2    *PGM      CLP                     73728
    _   QTTMRME1    *PGM      CLP                    122880
    _   QTTMRME2    *PGM      CLP                     77824
    _   UNPACKAGE   *PGM      CLP                    139264
    _   QATTBAS     *FILE     SAVF                    53248
    _   QATTCBL     *FILE     SAVF                   188416
    _   QATTCL      *FILE     SAVF                  1093632
    _   QATTCMD     *FILE     SAVF                   360448
                                                                   More...
   F3=Exit   F12=Cancel   F17=Top   F18=Bottom
```

11. Verify that the library was restored from the Cloud Object Storage Location

    - **WRKSTSICC STATUS(*ALL)**

      - Volume name – Q21041
      - Status – Success
      - Oper – FRMCLD (From Cloud)

```
__  QBRMS_I922BRMC/Q21041  <- Volume Name                                  *********9
     06/05/20 15:22 QPADEV0001 QSECOFR    005375 Success     FRMCLD              99
                                                                          More...
```

12. View the media to verify that it is at the home location:

- **WRKMEDBRM FILEGRP(QCLDUUSR01)**
  - verify the volume is in *ACT status
  - verify the location is *HOME

```
Opt  Volume Serial   Status   Creation Date   Expiration Date   Location   Move Date   Media Class   Dup Sts
_    Q21041          *ACT     06/01/20        06/22/20          *HOME      06/05/20    QCLDVRTTAP
```

13. Clear the library:
    - **CLRLIB LIB(CLDLIB)**
    - **WRKLIB LIB(CLDLIB)**
      - Specify 12=Display

```
                                Work with Libraries

Type options, press Enter.
  1=Create    2=Change    3=Copy     4=Delete    5=Display    6=Print
  8=Display library description    9=Save      10=Restore
  11=Save changed objects         12=Work with objects    14=Clear

                                ASP
Opt  Library     Attribute      Device      Text

12   CLDLIB      PROD
```

```
Opt  Object      Type      Library     Attribute   Text

  (Cannot find object to match specified name.)
```

14. Restore objects to library CLDLIB:
    - **WRKMEDIBRM CTLGRP(QCLDUUSR01)**
      - Press F11 once
      - Saved library CLDLIB with *ERR (Obj Dtl =*NO)
      - Saved library CLDLIB with *OBJ (Obj Dtl = *YES)

```
Opt  Saved Item   Save Date   Save Time   Save Type   Parallel Devices   Volume Serial   File Sequence   Expire Date
_    CLDLIB       6/01/20     21:53:04    *FULL                          Q21041                1          6/22/20
_    CLDLIB       6/10/20     20:55:36    *FULL                          Q05692                1          7/01/20
```

```
     Saved          Save      Save    Item        ----- Objects -----  Control     Obj
 Opt Item           Date      Time    Type           Saved  Not Saved  Group       Dtl
  __ CLDLIB       6/01/20 21:53:04 *LIB              24          0  QCLDUUSR01  *NO
  __ CLDLIB       6/10/20 20:55:36 *LIB              24          0  QCLDUUSR01  *YES
```

15. Restore objects with *ERR (Obj Dtl =*NO)

- specify 7=Restore next to the saved item
  - specify 7=Specify object

```
 Type options, press Enter.
   2=Change    4=Remove    5=Display    6=Work with media    7=Restore
   9=Work with saved objects    ...

    Saved          Save      Save    Save    Parallel Volume     File         Expire
Opt Item           Date      Time    Type    Devices  Serial     Sequence     Date
 7_ CLDLIB       6/01/20 21:53:04 *FULL              Q21041            1      6/22/20
```

```
    Type options, press Enter.
      1=Select    4=Remove    5=Display    7=Specify object

       Saved          Save      Save    Save    Parallel Volume     File         Expire
   Opt Item           Date      Time    Type    Devices  Serial     Sequence     Date
    7  CLDLIB       6/01/20 21:53:04 *FULL              Q21041            1      6/22/20
```

- Objects = QATTCMD, QATTINFO (You will need to know the object names with *ERR).
  - Take the defaults and press Enter

```
                              Restore Object (RSTOBJ)

    Type choices, press Enter.

    Objects  . . . . . . . . . . . . . > QATTCMD      Name, generic*, *ALL
                   + for more values > QATTINFO
    Saved library  . . . . . . . . . . > CLDLIB       Name, generic*, *ANY, *SELECT
    Device . . . . . . . . . . . . . . > Q1AVTAP001   Name, *SAVF, *MEDDFN
                   + for more values
    Object types . . . . . . . . . . . > *ALL         *ALL, *ALRTBL, *BNDDIR...
                   + for more values
    Volume identifier  . . . . . . . . > Q21041
                   + for more values
    Sequence number  . . . . . . . . . > 0000000001   1-16777215, *SEARCH
    Starting position in file  . . . . > *FIRST       Hexadecimal value, *FIRST
    Label  . . . . . . . . . . . . . .   *SAVLIB
    End of media option  . . . . . . . > *REWIND      *REWIND, *LEAVE, *UNLOAD
    Option . . . . . . . . . . . . . . > *ALL         *ALL, *NEW, *OLD, *FREE
```

```
    2 objects restored from CLDLIB to CLDLIB.
```

16. Restore objects with *OBJ (Obj Dtl =*YES)

- specify 9=Work with saved objects

```
                          Work with Media Information                    I922BRMC

  Position to Date . . . . . ________

  Type options, press Enter.
    2=Change    4=Remove    5=Display    6=Work with media    7=Restore
    9=Work with saved objects    ...

     Saved          Save      Save    Item        ----- Objects ----- Control     Obj
Opt  Item           Date      Time    Type           Saved  Not Saved Group       Dtl
  __ CLDLIB       6/01/20 21:53:04 *LIB              24          0 QCLDUUSR01 *NO
  9_ CLDLIB       6/10/20 20:55:36 *LIB              24          0 QCLDUUSR01 *YES
```

- specify 7=Restore object on (QATTBAS, QATTCBL)
- press Enter

```
                           Work with Saved Objects                       I922BRMC

  Position to Object . . .  ____________

  Type options, press Enter.
    4=Remove    5=Display    6=Work with media    7=Restore object
    9=Work with saved members

                                                Save        Save                Message
Opt Object       Library       Type             Date        Time     Volume     ID
  _ PACKAGE      CLDLIB        *PGM             6/10/20   20:55:36   Q05692
  7 QATTBAS      CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  7 QATTCBL      CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  _ QATTCL       CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  _ QATTCMD      CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  _ QATTDDS      CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  _ QATTIFS      CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  _ QATTINFO     CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  _ QATTPAS      CLDLIB        *FILE            6/10/20   20:55:36   Q05692
  _ QATTPL1      CLDLIB        *FILE            6/10/20   20:55:36   Q05692
                                                                          More...
```

- press Enter

```
                             Select Recovery Items                       I922BRMC

  Type options, press Enter.  Press F16 to select all.
    1=Select    4=Remove    5=Display


                                                Save      Expiration            Message
Opt Object       Library       Type             Date        Date      Volume     ID
  1 QATTBAS      CLDLIB        *FILE            6/10/20    7/01/20   Q05692
  1 QATTCBL      CLDLIB        *FILE            6/10/20    7/01/20   Q05692
```

17. Verify that the objects were restored:

- **DSPLIB LIB(CLDLIB)**

```
                                Display Library

Library  . . . . . . . :   CLDLIB          Number of objects  . :   4
Type . . . . . . . . . :   PROD            Library ASP number . :   1
Create authority . . :   *CHANGE         Library ASP device . :   *SYSBAS
                                           Library ASP group  . :   *SYSBAS

Type options, press Enter.
  5=Display full attributes   8=Display service attributes

Opt  Object      Type      Attribute                Size  Text
 _   QATTBAS     *FILE     SAVF                    53248
 _   QATTCBL     *FILE     SAVF                   188416
 _   QATTCMD     *FILE     SAVF                   360448
 _   QATTINFO    *FILE     PF                    1634304  Source data base file
```

NOTES:

1. Media created with automatic transfer to the cloud can be marked for duplication, but the duplication requires that the media be moved out of the cloud location before the duplication can be performed.
2. Automatic duplication, specified through a media policy, is not supported for media that is created with automatic transfer to the cloud.

User Initiated Transfers of Media to Cloud Storage

Virtual media from an image catalog is transferred to the cloud when the media is moved to a cloud location. Media can be moved to a cloud location by using one of these methods:

1. Change the location of the media to a cloud location using one of the following interfaces:

- **WRKMEDBRM** option 2=Change

- **WRKMEDBRM** option 8=Move
- use the BRMS GUI client to change the media location

2. Add an entry for a cloud location to a move policy, associate virtual media with the move policy and run movement for the move policy using one of the following commands:

- **MOVMEDBRM**
- **MOVMEDBRM** with a subsequent **VFYMOVBRM**
- **STRMNTBRM MOVMED(*YES)**

This scenario assumes Media and Storage Extensions (product 5770SS1 option 18) is installed on the system so it uses virtual tape media. If Media and Storage Extensions is not installed on the system, virtual optical media can be substituted in the example.

This scenario will save a single empty library to virtual tape media, manually transfer the media to the cloud and then automatically transfer media back to the system during a restore.

3. Create a cloud resource named TOR1CLD by running the following commands if not already created:
    - **CRTS3RICC**

```
Type choices, press Enter.

Resource name  . . . . . . . . . . > TOR1CLD      Name
Resource description . . . . . . . > 'Cloud Object Storage Toronto 01'
Access key id  . . . . . . . . . . > 47035e8053054437b1dc385a5953ae43

Secret access key  . . . . . . . .

Use compression  . . . . . . . . .   *NO           *NO, *YES
Use encryption . . . . . . . . . .   *NO           *NO, *YES
Bucket . . . . . . . . . . . . . . > 'brms-bucket-backupvol'
```

```
Type choices, press Enter.

Resource URI . . . . . > 's3.private.us-east.cloud-object-storage.app
domain.cloud'
```

9. Configure BRMS objects required to use the cloud resource:
    - **INZBRM OPTION(*DATA)**
10. The pre-defined cloud control groups that BRMS created for the cloud resource should be setup to work as defined.

```
Position to . . . . . .  __________   Starting characters

Type options, press Enter
  1=Create    2=Edit entries    3=Copy      4=Delete   5=Display
  6=Add to schedule   8=Change attributes   9=Subsystems to process ...
                Full       Incr       Weekly
    Control     Media      Media      Activity
Opt Group       Policy     Policy     SMTWTFS  Text
__  __________
__  *BKUGRP     *BKUPCY    *BKUPCY    *BKUPCY  Backs up all user data
__  *SYSGRP     SAVSYS     SAVSYS     *BKUPCY  Backs up all system data
__  *SYSTEM     SYSTEM     SYSTEM     *BKUPCY  Backs up the entire system
__  QCLDBGRP01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
__  QCLDBIPL01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
__  QCLDBSYS01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
__  QCLDBUSR01  TOR1CLD    TOR1CLD    *BKUPCY  Entry created by BRM configura
```

11. Create a virtual tape device:
    - **CRTDEVTAP DEVD(TOR1CLDTAP) RSRCNAME(*VRT)**

```
                    Create Device Desc (Tape) (CRTDEVTAP)

  Type choices, press Enter.

  Device description . . . . . . > TOR1CLDTAP    Name
  Device type  . . . . . . . . .   *RSRCNAME     *RSRCNAME, EU11, EU16, 2440...
  Device model . . . . . . . . .   *RSRCNAME     *RSRCNAME, 1, 2, 12, A01...
  Resource name  . . . . . . . . > *VRT          Name, *NONE, *VRT...
```

12. Vary on the virtual tape device:
    - **VRYCFG CFGOBJ(TOR1CLDTAP) CFGTYPE(*DEV) STATUS(*ON)**

```
Selection or command
===> VRYCFG CFGOBJ(TOR1CLDTAP) CFGTYPE(*DEV) STATUS(*ON)

F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F13=Information Assistant
F23=Set initial menu
Vary on completed for device TOR1CLDTAP.
```

13. Create an image catalog:

- **CRTIMGCLG IMGCLG(TOR1CLDTAP) TYPE(*TAP) DIR('/tmp/TOR1CLDTAP') CRTDIR(*YES)**

```
                    Create Image Catalog (CRTIMGCLG)

Type choices, press Enter.

Image catalog  . . . . . . . . . . > TOR1CLDTAP     Name
Directory  . . . . . . . . . . . . > '/tmp/TOR1CLDTAP'

Image catalog type . . . . . . . . > *TAP           *OPT, *TAP
Create directory . . . . . . . . . > *YES           *YES, *NO
Import image catalog . . . . . . .   *NO            *NO, *YES
Catalog ASP threshold  . . . . . .   *CALC          1-99, *CALC, *MAX
Add virtual volumes  . . . . . . .   *NONE          1-256, *NONE, *DIR
```

- **WRKIMGCLG**

```
                         Work with Image Catalogs
                                                          System:   I922BRMC
Type options, press Enter.
  1=Create   2=Change   4=Delete   8=Load   9=Unload   10=Verify
  12=Work with entries

     Image                                ASP                  Device
Opt  Catalog      Status      Type     Threshold  Device      Status

__   Q1ABRMPOOL   Not ready   Tape       *CALC
__   Q1ACQ21041   Not ready   Tape       *CALC
__   Q1ACQ25283   Not ready   Tape       *CALC
__   TOR1CLDTAP   Not ready   Tape       *CALC
```

14. Add a volume to the image catalog:

- **ADDIMGCLGE IMGCLG(TOR1CLDTAP) FROMFILE(*NEW) TOFILE(*GEN) VOLNAM(TORCLD)**

```
                    Add Image Catalog Entry (ADDIMGCLGE)

 Type choices, press Enter.

 Image catalog  . . . . . . . . . > TOR1CLDTAP     Name
 From optical device, or  . . . .                  Name, *VOL
 From image file  . . . . . . . . > *NEW
 To image file  . . . . . . . . . > *GEN
 Image catalog index  . . . . . .   *AVAIL         1-256, *AVAIL
 Replace catalog entry  . . . . .   *NO            *NO, *YES, *INSERT
 Media type . . . . . . . . . . .   *RAM           *RAM, *WORM, *RMS, *ERASE
 Image size . . . . . . . . . . .   *IMGCLGTYPE    Megabytes, *CD650, *DVD2600...
 Text 'description' . . . . . . .   *GEN

                         Additional Parameters

 Allocate storage size  . . . . .   *MIN           *MIN, *IMGSIZ
                                                                          More...
```

```
                    Add Image Catalog Entry (ADDIMGCLGE)

 Type choices, press Enter.

 Tape volume name . . . . . . . . > TORCLD         Character value, *GEN
 Volume type  . . . . . . . . . .   *SL            *SL, *NL
 Tape density . . . . . . . . . .   *VRT256K       *VRT256K, *VRT240K...
 New owner identifier . . . . . .   *BLANK
 Code . . . . . . . . . . . . . .   *EBCDIC        *EBCDIC, *ASCII
```

15. Load the image catalog on the device:

- **LODIMGCLG IMGCLG(TOR1CLDTAP) DEV(TOR1CLDTAP)**

```
                 Load or Unload Image Catalog (LODIMGCLG)

 Type choices, press Enter.

 Image catalog  . . . . . . . . . > TOR1CLDTAP     Name
 Option . . . . . . . . . . . . .   *LOAD          *LOAD, *UNLOAD
 Virtual device . . . . . . . . . > TOR1CLDTAP     Name
 Write protect  . . . . . . . . .   *DFT           *DFT, *ALL, *NONE
 Library mode . . . . . . . . . .   *NO            *NO, *YES
```

- **WRKIMGCLG**

```
                         Work with Image Catalogs
                                                          System:   I922BRMC
 Type options, press Enter.
   1=Create   2=Change   4=Delete   8=Load   9=Unload   10=Verify
   12=Work with entries

      Image                                ASP                  Device
 Opt  Catalog      Status      Type     Threshold  Device      Status

 __   Q1ABRMPOOL   Not ready   Tape       *CALC
 __   Q1ACQ21041   Not ready   Tape       *CALC
 __   Q1ACQ25283   Not ready   Tape       *CALC
 __   TOR1CLDTAP   Ready       Tape       *CALC     TOR1CLDTAP  Varied on
```

16. Configure the virtual tape device in BRMS:

- **WRKDEVBRM**
  - specify 1=Create for the Opt field
  - specify TOR1CLDTAP for the Device field
  - specify *VRTTAP for the Category field
  - Press Enter and take defaults for all other fields

```
                                Work with Devices                          I922BRMC

 Position to . . . . . .  __________    Starting characters

 Type options, press Enter.
   1=Add    2=Change    4=Remove    5=Display
   8=Work with status

 Opt    Device       Category   Type/Model   Text
  1     TOR1CLDTAP   *VRTTAP
  _     BO_CUM_GA    *OPT       632B/003     Entry created by BRM configuration
  _     OPT01        *OPT       632C/002     Entry created by BRM configuration
  _     OPT02        *OPT       632C/002     Entry created by BRM configuration
  _     OPT03        *OPT       632C/002     Entry created by BRM configuration
  _     Q1AVTAP001   *VRTTAP    63B0/001     Entry created by BRM configuration
```

```
                              Add Virtual Tape Device

 Virtual device  . . . . . . . . . :   TOR1CLDTAP
 Device type/model . . . . . . . . :   63B0/001

 Type choices, press Enter.

 Text  . . . . . . . . . . . . . . .   *NONE
 __________
 Location  . . . . . . . . . . . . .   *HOME       Name, F4 for list

 Use optimum block size  . . . . . .   *NO         *NO, *YES
 Next volume message . . . . . . . .   *NO         *YES, *NO
 Volume mount delay  . . . . . . . .   *IMMED      *IMMED, 1-999
 Auto enroll media . . . . . . . . .   *NO         *SYSPCY, *NO, *YES

 Shared device . . . . . . . . . . .   *NO         *YES, *NO
   Shared device wait  . . . . . . .        30     Seconds
```

```
 Opt    Device       Category   Type/Model   Text
 _      __________   ________
 _      BO_CUM_GA    *OPT       632B/003     Entry created by BRM configuration
 _      OPT01        *OPT       632C/002     Entry created by BRM configuration
 _      OPT02        *OPT       632C/002     Entry created by BRM configuration
 _      OPT03        *OPT       632C/002     Entry created by BRM configuration
 _      Q1AVTAP001   *VRTTAP    63B0/001     Entry created by BRM configuration
 _      TOR1CLDTAP   *VRTTAP    63B0/001     *NONE
```

17. Add a media class for the virtual tape media:
    - **WRKCLSBRM TYPE(*MED)**
      - specify 1=Create for the Opt field

- specify TOR1CLDTAP for the Class field
    - specify *VRT256K for the Density field
    - specify *NO for the Shared media field

```
                                Work with Media Classes                    I922BRMC

  Position to . . . . . .  __________    Starting characters

  Type options, press Enter.
    1=Add    2=Change    3=Copy    4=Remove    5=Display    6=Work with media

  Opt    Class        Density     Capacity     Text
   1     TOR1CLDTAP
   _     FMTOPTUDF    *UDF        *DENSITY     Entry created by BRM configuration
   _     QAVVRTOPT    *VRTUDF     *DENSITY     Entry created by BRM configuration
   _     QAVVRTTAP    *VRT256K    *DENSITY     Entry created by BRM configuration
   _     QCLDVRTOPT   *VRTUDF     *DENSITY     Entry created by BRM configuration
   _     QCLDVRTTAP   *VRT256K    *DENSITY     Entry created by BRM configuration
   _     SAVSYS       *UDF        *DENSITY     Entry created by BRM configuration
```

```
                                  Add Media Class

  Type choices, press Enter.

  Media class . . . . . . . . . . . .   TOR1CLDTAP    Name
  Density . . . . . . . . . . . . . .   *VRT256K      F4 for list
  Media capacity  . . . . . . . . . .   *DENSITY      *DENSITY, Number nnnnn.nn
    Unit of measure . . . . . . . . .    _            1=KB, 2=MB, 3=GB
  Mark for label print  . . . . . . .   *NONE         *NONE, *MOVE, *WRITE
  Label size  . . . . . . . . . . . .   1             1=6 LPI, 2=8 LPI, 3=9 LPI
  Label output queue  . . . . . . . .   *SYSPCY       Name, *SYSPCY, *PRTF
    Library . . . . . . . . . . . . .   __________    Name, *LIBL
  Shared media  . . . . . . . . . . .   *NO           *YES, *NO
  Write once media  . . . . . . . . .   *NO           *YES, *NO
  Initialize media on expiration. . .   *NO           *NO, *YES
  Text  . . . . . . . . . . . . . . .   ________________________________________
  __________
```

```
                                Work with Media Classes                    I922BRMC

  Position to . . . . . .  __________    Starting characters

  Type options, press Enter.
    1=Add    2=Change    3=Copy    4=Remove    5=Display    6=Work with media

  Opt    Class        Density     Capacity     Text
   _     __________
   _     FMTOPTUDF    *UDF        *DENSITY     Entry created by BRM configuration
   _     QAVVRTOPT    *VRTUDF     *DENSITY     Entry created by BRM configuration
   _     QAVVRTTAP    *VRT256K    *DENSITY     Entry created by BRM configuration
   _     QCLDVRTOPT   *VRTUDF     *DENSITY     Entry created by BRM configuration
   _     QCLDVRTTAP   *VRT256K    *DENSITY     Entry created by BRM configuration
   _     SAVSYS       *UDF        *DENSITY     Entry created by BRM configuration
   _     TOR1CLDTAP   *VRT256K    *DENSITY
```

18. Add volume TORCLD to the BRMS media inventory:
    - **ADDMEDBRM VOL(TORCLD) MEDCLS(TOR1CLDTAP) IMGCLG(TOR1CLDTAP)**

```
                         Add Media to BRM (ADDMEDBRM)

 Type choices, press Enter.

 Volume identifier  . . . . . . . > TORCLD
 Media class  . . . . . . . . . . > TOR1CLDTAP     FMTOPTUDF, QAVVRTOPT, QAVVR...
 Number to add  . . . . . . . . .   1              1-999
 Initialize media . . . . . . . .   *NO            *NO, *YES
 Expiration date  . . . . . . . .   *NONE          Date, *PERM, *NONE
 Creation date  . . . . . . . . .   *CURRENT       Date, *CURRENT
 System . . . . . . . . . . . . .   *LCL
 Text . . . . . . . . . . . . . .   *NONE

 Image catalog  . . . . . . . . . > TOR1CLDTAP     Name, *NONE
```

- **WRKMEDBRM VOL(TORCLD)**

```
 Opt  Volume Serial   Status   Creation Date   Expiration Date   Location   Move Date   Media Class   Dup Sts
 __   TORCLD          *EXP     06/08/20        *NONE             *HOME      *NONE       TOR1CLDTAP
```

19. Add a media policy for the virtual tape media:

- **WRKPCYBRM TYPE(*MED)**
  - specify 1=Create for the Opt field
  - specify TOR1CLDTAP for the Policy field
    - specify TOR1CLDTAP for the Media class field

```
                         Work with Media Policies                          I922BRMC

 Position to . . . . . .  __________    Starting characters

 Type options, press Enter
  1=Create   2=Change   3=Copy   4=Delete   5=Display

 Opt Policy       Text
  1  TOR1CLDTAP
  _  ARCHIVAL     Entry created by BRM configuration
  _  FMTOPTUDF    Entry created by BRM configuration
  _  FULL         Entry created by BRM configuration
  _  INCR         Entry created by BRM configuration
```

```
                              Create Media Policy

 Type choices, press Enter.

   Media policy . . . . . . . . . . . .   TOR1CLDTAP    Name
   Retention type . . . . . . . . . . .   2             1=Date, 2=Days,
                                                        3=Versions, 4=Permanent
     Retain media . . . . . . . . . . .   35            Date, Number
     Deleted library retention. . . .   *NONE          Number, *NONE
   Move policy  . . . . . . . . . . .   *NONE          Name, *NONE, *ADSM, F4
   Media class  . . . . . . . . . . .   TOR1CLDTAP     Name, *SYSPCY, *ADSM, F4
   Storage location . . . . . . . . .   *ANY           Name, *ANY, F4 for list
   Save to save file  . . . . . . . .   *NO            *YES, *NO
     ASP for save files . . . . . . .   *SYSTEM        Name, *SYSTEM, 1-32
     Save file retention type . . . .   4               1=Date, 2=Days,
                                                        3=Permanent, 4=None
       Retain save files  . . . . . .   *NONE          Date, Number, *NONE
     ASP storage limit  . . . . . . .   *SYS           *SYS, 1-99
   Secure media . . . . . . . . . . .   *NO            *YES, *NO, *ADSM

                                                                        More...
```

20. Create a library to save to the cloud:

    - **CRTLIB LIB(CLDLIB)**

```
                              Create Library (CRTLIB)

 Type choices, press Enter.

 Library  . . . . . . . . . . . . . > CLDLIB      Name
 Library type . . . . . . . . . . .   *PROD       *PROD, *TEST
 Text 'description' . . . . . . . .   *BLANK
```

21. Save the library to the virtual tape volume:

    - **SAVLIBBRM LIB(CLDLIB) DEV(TOR1CLDTAP) MEDPCY(TOR1CLDTAP)**

```
320 blocks processed for sequence 1, volume TORCLD, on device TOR1CLDTAP.    +
```

22. Move volume TORCLD to the cloud location:

    - **WRKMEDBRM VOL(TORCLD)**
        - verify the volume is in *ACT status
        - verify location *HOME
        - specify 8=Move for the Opt field

```
                                   Work With Media
                                                                   System:   I922BRMC
 Position to  . . . . .   ______        Starting characters

 Type options, press Enter.
   1=Add    2=Change    4=Remove    5=Display    6=Work with serial set    7=Expire
   8=Move    9=Remove volume error status      10=Reinitialize ...

      Volume                Creation Expiration                Move      Media      Dup
 Opt  Serial    Status        Date      Date     Location      Date      Class      Sts

 8    TORCLD     *ACT      06/09/20  07/14/20   *HOME        *NONE     TOR1CLDTAP
```

- specify TOR1CLD for the Storage location field

```
                                     Move Media

 Type storage location or container to receive volumes.

   Storage location . . .   TOR1CLD      *SAME, F4 for list
   Container  . . . . . .   *SAME        *SAME, *NONE, F4 for list
   Exempt from movement     *SAME        *SAME, 0 - 9999

      Volume                Creation Expiration                Move      Media      Dup
 Opt  Serial    Status        Date      Date     Location      Date      Class      Sts
 8    TORCLD     *ACT      06/09/20  07/14/20   *HOME        *NONE     TOR1CLDTAP
```

- verify the volume is in *ACT status
- verify location TOR1CLD

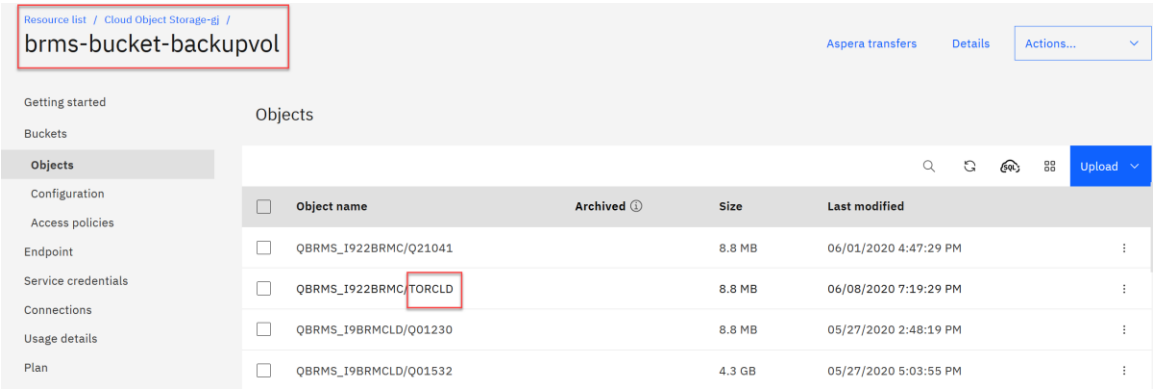
```
                                   Work With Media
                                                                   System:   I922BRMC
 Position to  . . . . .   ______        Starting characters

 Type options, press Enter.
   1=Add    2=Change    4=Remove    5=Display    6=Work with serial set    7=Expire
   8=Move    9=Remove volume error status      10=Reinitialize ...

      Volume                Creation Expiration                Move      Media      Dup
 Opt  Serial    Status        Date      Date     Location      Date      Class      Sts

 _    TORCLD     *ACT      06/09/20  07/14/20   TOR1CLD      06/09/20 TOR1CLDTAP
```

- verify the volume is in Cloud Object Storage



23. Delete the library:

- **DLTLIB LIB(CLDLIB)**

```
Library CLDLIB deleted.
```

24. Restore the library:

- **RSTLIBBRM SAVLIB(CLDLIB) DEV(TOR1CLDTAP)**

```
                    Restore Library using BRM (RSTLIBBRM)

Type choices, press Enter.

Library  . . . . . . . . . . . . . > CLDLIB      Name, generic*, *MEDINF...
                 + for more values
Device . . . . . . . . . . . . . . > TOR1CLDTAP  Name, *MEDCLS
                 + for more values
Parallel device resources:
  Minimum resources  . . . . . .    *SAV         1-32, *SAV, *NONE, *AVAIL
  Maximum resources  . . . . . .    *MIN         1-32, *MIN, *AVAIL
Save level . . . . . . . . . . .    *CURRENT     1-99, *CURRENT, *SAVDATE
Saved auxiliary storage pool . .    *ANY         Name, 2-32, *ANY, *SYSTEM
End of media option  . . . . . .    *REWIND      *REWIND, *LEAVE, *UNLOAD
Option . . . . . . . . . . . . .    *ALL         *ALL, *NEW, *OLD, *FREE
Database member option . . . . .    *MATCH       *MATCH, *ALL, *NEW, *OLD
Spooled file data  . . . . . . .    *NEW         *NEW, *NONE
Libraries to omit  . . . . . . .    *NONE        Name, generic*, *NONE
                 + for more values
```

```
24 objects restored from CLDLIB to CLDLIB.
```

25. Verify that the library was restored:

- **DSPLIB LIB(CLDLIB)**

```
                              Display Library

Library  . . . . . . . :   CLDLIB          Number of objects  . :   23
Type . . . . . . . . . :   PROD            Library ASP number . :   1
Create authority . . :   *CHANGE           Library ASP device . :   *SYSBAS
                                           Library ASP group  . :   *SYSBAS
```

```
     Volume                Creation Expiration                Move     Media      Dup
Opt  Serial    Status        Date      Date     Location      Date     Class      Sts

_    TORCLD     *ACT       06/09/20  07/14/20   *HOME       06/09/20 TOR1CLDTAP
```

NOTES

- When control groups are run that have a name with a QCLD prefix will, BRMS will automatically create and transfer media to the cloud. For more information regarding automatic cloud transfers see Automatic Transfers of Media to Cloud Storage.
- If using user created images, BRMS will not manage these image catalog entries. As such, when the data is transferred to the cloud, the images will not be cleared or deleted. Users will need to manage these themselves. it is recommended using CHGIMGCLGE with the parameter IMGCLG(*MIN) to shrink the size down as much as possible.

Chapter 3: Troubleshooting

Media status *TRF

Each BRMS volume has a status. The status how the volume is currently being used. Status *TRF has been added to indicate a volume has pending cloud operations. Run the following command to see all media that has a status of *TRF:

WRKMEDBRM TYPE(*TRF)

```
     Volume                Creation Expiration                Move      Media       Dup
Opt  Serial     Status      Date      Date      Location       Date      Class       Sts
__   ______     ------    --------  --------  ----------    --------  ----------  ---
__   Q03276      *TRF     05/21/20  06/11/20  BRMSCLD       05/21/20  QCLDVRTTAP
__   Q15373      *TRF     05/20/20  06/10/20  CLDTEST       05/20/20  QCLDVRTTAP
__   Q16559      *TRF     05/20/20  06/10/20  BRMSCLD       05/20/20  QCLDVRTTAP
__   Q28330      *TRF     05/21/20  06/11/20  BRMSCLD       05/21/20  QCLDVRTTAP
__   Q31739      *TRF     05/21/20  06/11/20  BRMSCLD       05/21/20  QCLDVRTTAP
```

Most cloud transfers will be started by BRMS but run in jobs in subsystem QICCSBS. To determine which jobs have been used to process cloud transfers for BRMS run the following command:

WRKSTSICC STATUS(*ALL)

```
                              Work with ICC Status                        I9BRMCLD

Type options, press Enter.
   4=End

                     --------- Job --------------                      Graphic% /
Opt File name/Time   Name       User       Number Status      Oper     Complete%
__  /tmp/brms/userData/cloud/Q1ACQ18921/Q18921
     05/21/20 22:05 L000000006 QSECOFR     006964 Failed      TOCLD            0
__  /tmp/brms/userData/cloud/Q1ACQ08520/Q08520                           **********
     05/21/20 22:10 L000000007 QSECOFR     006965 Success     TOCLD          100
__  /tmp/brms/userData/cloud/Q1ACQ05148/Q05148                           **********
     05/27/20 17:34 L000000008 QSECOFR     015876 Success     TOCLD          100
__  QBRMS_I9BRMCLD/Q05148                                               *********9
     05/27/20 17:34 QPADEV0002 QSECOFR     015867 Success     FRMCLD          99
__  /tmp/brms/userData/cloud/Q1ACQ16559/Q16559
     05/27/20 19:09 L000000010 QSECOFR     015970 Failed      TOCLD            0
                                                                          More...
```

Use the job information from the failed transfer to work with the job. The job log will contain information about the transfer:

WRKJOB JOB(015970/QSECOFR/L000000010)

option 4=Work with spooled files

option 5=Display

Resolving cloud transfer problems

When a transfer to the cloud fails, the volumes may be left in *TRF status. Once the transfer problem has been understood and fixed, if the volume still has a status of *TRF and the location is the cloud location, do the following recovery on the source system:

- Use **WRKMEDBRM** option 8 'Move' to change the Storage location to *HOME
- Run **STRMNTBRM MOVMED(*YES)** or **MOVMEDBRM** to retry the cloud transfer

ICC Flight Recorder Directory

The ICC flight recorder is used to further diagnose file transfer to and from the Cloud.

WRKLNK /QIBM/ProdData/QICC

```
                              Work with Object Links

Directory  . . . . :   /QIBM/ProdData/QICC

Type options, press Enter.
  2=Edit   3=Copy   4=Remove   5=Display   7=Rename   8=Display attributes
  11=Change current directory ...

Opt   Object link            Type     Attribute    Text
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
__    QICC-2020-07-29-11 >   STMF
                                                                        More...
```

Select the most current STMF file. Option 5=Display

```
                                   Work with Object Links

   Directory  . . . . :   /QIBM/ProdData/QICC

   Type options, press Enter.
     2=Edit    3=Copy    4=Remove    5=Display    7=Rename    8=Display attributes
     11=Change current directory ...

   Opt    Object link              Type      Attribute     Text
   5_     QICC-2020-07-29-11 >     STMF
```

You can verify the IP address your using for the Direct Link (DL) Private connection and the COS Bucket.

```
 Browse : < ata/QICC/QICC-2020-07-29-11-48-04-636836-QSECOFR-L000000326.log
 Record : _____1   of  153023 by _16                    Column : __1     59 by 131
 Control : _____________________________________________________________

....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0....+....1....+....2....+....3.
 ************Beginning of data**************
---STARTING COPY TO CLOUD---
Local filename:
Path: /IASP33/cloud/Q1ACQ13880/Q13880
Cloud filename:
Path: QBRMS_I922BRMC/Q13880
validateLocalFile: size 10483716257, ccsid 37
makeS3Client: Connect-to server: 10.166.112.144

host: 10.166.112.144
addS3Header is adding header: Host

addS3Header is adding header: x-amz-date

addS3Header is adding header: x-amz-content-sha256

buildS3Request: Canonical Request = HEAD
/brms-bucket-backupvol
```

Verify the cloud resource is functioning correctly

CPYTOCLD and press F4.

- *You must create a cloud resource.*
- *You must have IBM® i Read (*R) authority on the file that you will copy, and Execute (*X) authority on all directories in the path leading to the file. For example, if you will copy the file /home/user/jdoe/file.txt, you must have Execute authority on the home, user, and jdoe directories, and Read authority on file.txt.*

- *Example: Using "/tmp/lpume.log"*
    - *Resource name = TOR1CLD (was created earlier)*
    - *Submit to batch = *NO (should be a small text file)*

- *Local file name = /tmp/plume.log (verify it is in your directory path)*
- *Cloud file name = test1cs (this can be any name, don't forget to cleanup file in COS if successful after your test)*

```
                         Copy ICC File to Cloud (CPYTOCLD)

   Type choices, press Enter.

   Resource name  . . . . . . . . . > TOR1CLD       Name
   Submit to batch  . . . . . . . . > *NO           *NO, *YES
   Local file name  . . . . . . . . > '/tmp/lpume.log'

   Cloud file name  . . . . . . . . > test1cs
```

You should see "File copied."

```
Parameters or command
===>
F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve   F12=Cancel   F17=Position to
F22=Display entire field           F23=More options
File copied.
```

Restore problems

CPF41B0 – Incorrect image catalog name specified.

Check the current location of the volume BRMS is trying to restore from in **WRKMEDBRM**. If the volume does not have a status of *ACT and the location is not the cloud location, run **STRMNTBRM MOVMED(*YES)** on the source and remote system and verify the volume has a status of *ACT and the location is the cloud. Retry the restore.

Chapter 4: Additional Resources

IBM Cloud Storage Solutions for IBM i User's Guide

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwjypYrCkMXpAhUCH80KHV69D5wQFjABegQIAxAB&url=https%3A%2F%2Fwww.ibm.com%2Fsupport%2Fknowledgecenter%2Fssw_ibm_i_73%2Ficc%2Ficcumstpdf.pdf&usg=AOvVaw01p3eqw7Tu0eqXHGmqWLsX

BRMS and Cloud Storage Solutions

https://helpsystemswiki.atlassian.net/wiki/spaces/IWT/pages/165642270/BRMS+and+Cloud+Storage+Solutions