

DISASTER RECOVERY

PROBLEM DEFINITION:-

The project involves creating a disaster recovery plan using IBM Cloud Virtual Servers. The objective is to safeguard business operations by developing a plan that ensures continuity for an on-premises virtual machine in unforeseen events. This plan will include setting up backup strategies, configuring replication, testing the recovery process, and guaranteeing minimal downtime. The project encompasses defining the disaster recovery strategy, implementing backup and replication, validating recovery procedures, and ensuring business continuity.

INTRODUCTION:-

Uptime is a key client expectation for IBM i workloads. Across geographic locations, this is accomplished with a disaster recovery (DR) solution. IBM Power Virtual Server (PowerVS) meets that requirement by enabling clients to leverage DR solutions between two IBM i Virtual Server Instances (VSIs) in separate IBM Cloud datacenters.

An important characteristic of DR solutions for PowerVS is that they are based on logical or operating system-level replication. Many Power Systems clients today use storage-based replication for DR, which is not an option with PowerVS.

This document will provide step-by-step instructions to accomplish both phases of configuring DR for IBM i workloads in PowerVS:-

1. Performing the required network configuration.
2. Implementing the DR solution itself.

USE CASES:-

PowerHA Geographic Mirroring:-

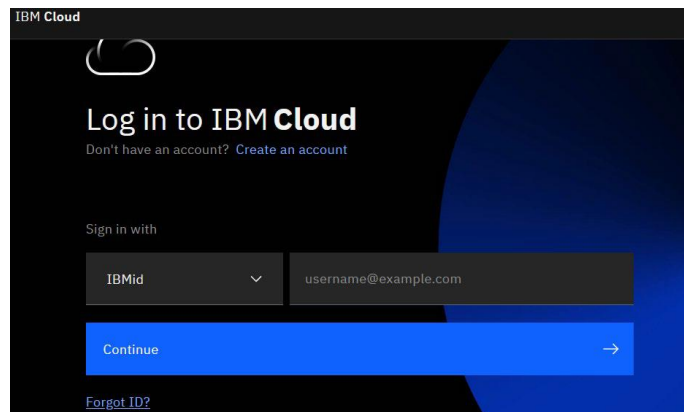
In this case we will demonstrate how to implement PowerHA Geographic Mirroring in IBM i, which provides DR by using operating system (OS) clustering and replication. This solution requires that the IBM i VSI and client application(s) use Independent Auxiliary Storage Pools (IASPs). If the IBM i VSI and application(s) use only *SYSBAS, this DR option will not work

CREATING DB2 AND COGNO SERVICE ON OUR IBM CLOUD ACCOUNT:-

After we creating a Lite account (Trail Free account) as a student. Login to IBM cloud.

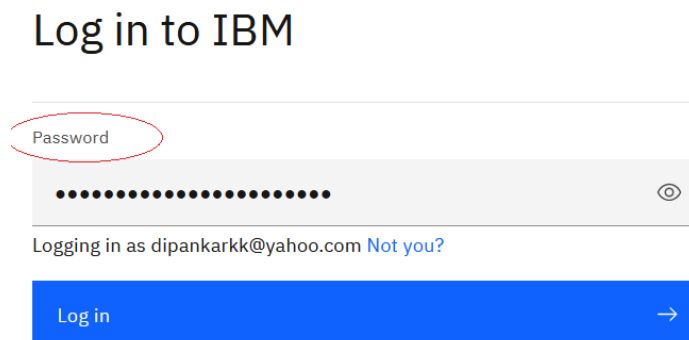
<https://cloud.ibm.com/login>

Enter your registered mail id.

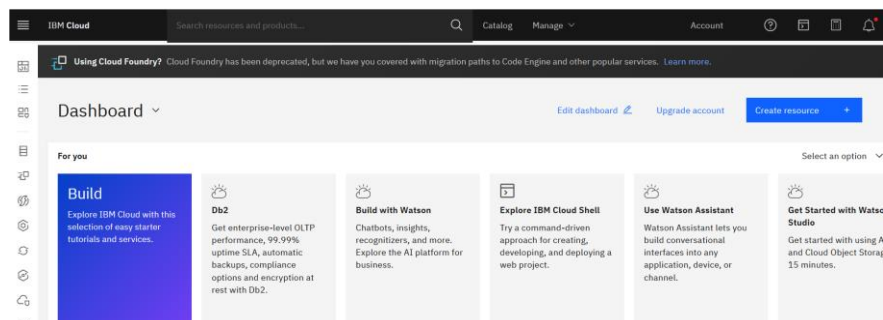


Then Enter Password

LOGIN TO IBM:-



After successfully login, user will be redirected to account Dashboard page.



ACCOUNT SETTING:-

The screenshot shows the IBM Cloud Account settings page. On the left is a sidebar menu with options: Account resources, Resource groups, Cloud Foundry orgs, Licenses and entitlements, Tags, Dashboards, Account settings (highlighted), IBM Cloud Shell settings, Notification distribution list, Classic infrastructure, Subscriptions, Audit log, and Company information. The main content area is titled 'Account' and shows 'Dipankar Chakraborty's Account' with ID: 79823648ee7d4bea7dbfb12daa79a37. Below this, 'Account Type' is set to 'Trial (Free)' with 254 days remaining. The 'Account upgrade' section offers 'Pay-As-You-Go' and 'Subscription' options. The 'Pay-As-You-Go' section includes a description and an 'Add credit card' button. The 'Subscription' section includes a description and an 'Upgrade' button.

Add IBM Cognos Dashboard Embedded service in your account:-

Click on **Catalog** menu on top page. Then enter Cognos in search box.

The screenshot shows the IBM Cloud Catalog search results. The search bar contains 'IBM Cognos Dashboard Embedded'. The results list includes 'IBM Cognos Dashboard Embedded' (highlighted with a red circle), 'Power Virtual Server with VPC landing zone', and 'Analytics Engine'.

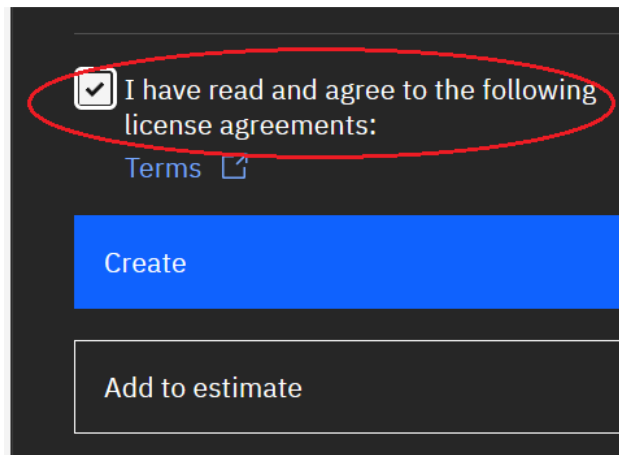
Click “**IBM Cognos Dashboard Embedded**”, it will redirect you to Cognos page. Once you are on Cognos page.

The screenshot shows the IBM Cognos Dashboard Embedded service page. The left sidebar contains a menu with options: Type, Service, Provider, IBM, Last updated, 07/06/2022, Category, Analytics, Compliance, IAM-enabled, Location, London, Dallas, Related links, Docs, and Terms. The main content area is titled 'IBM Cognos Dashboard Embedded' and includes a 'Create' button. Below the 'Create' button, there are sections for 'Select a location' (with 'London (eu-gb)' selected and circled in red), 'Select a pricing plan' (with 'Lite' selected and circled in red), and a table of pricing plans. The table has columns for Plan, Features and capabilities, and Pricing. The 'Lite' plan is highlighted, showing 50 sessions/month and a price of Free. The right sidebar contains a 'Summary' section with details about the service, including Location, Plan, Service name, and Resource group. At the bottom, there is a 'Create' button and an 'Add to estimate' button.

Select a Location: **London**

Select a pricing plan: **Lite**.

Select terms & condition (license agreements)



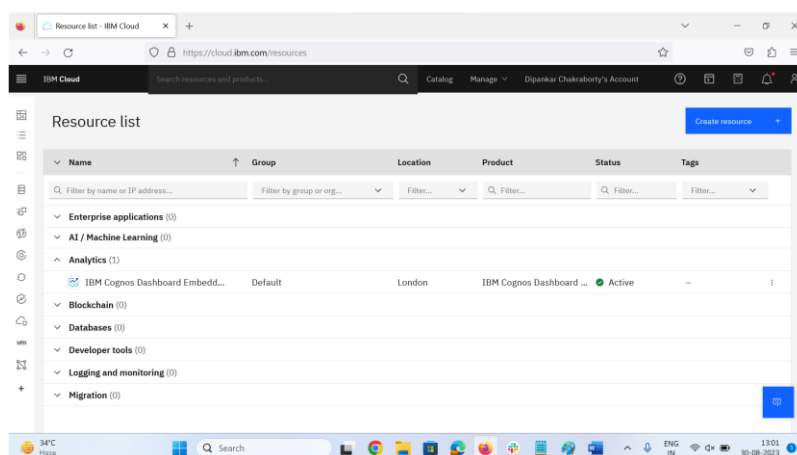
Then click on **Create** button.

After you click on create, it will take some time to create the service.

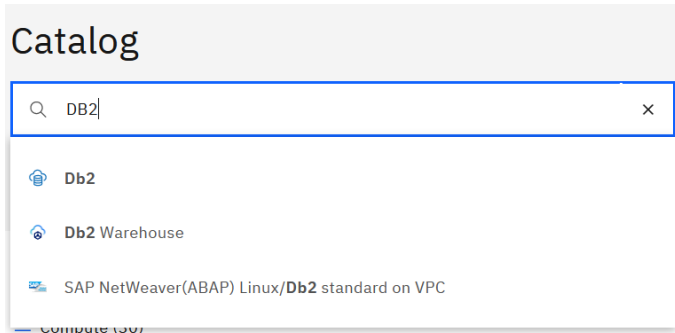
user will be redirect to Cognos tutorial page.



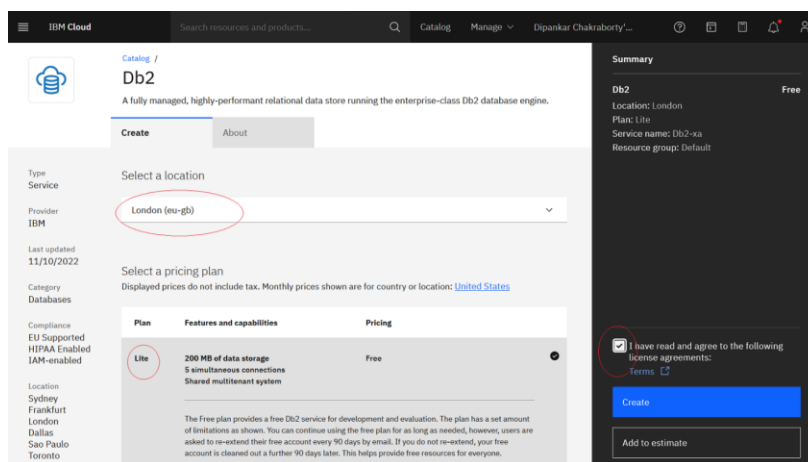
It takes few minutes to service created at cloud account. After few minutes you can check resource list.



Now again search DB2 on catalog



Click on Db2, you will be redirect to DB2 service page.



Select a Location: **London**

Select a pricing plan: **Lite**.

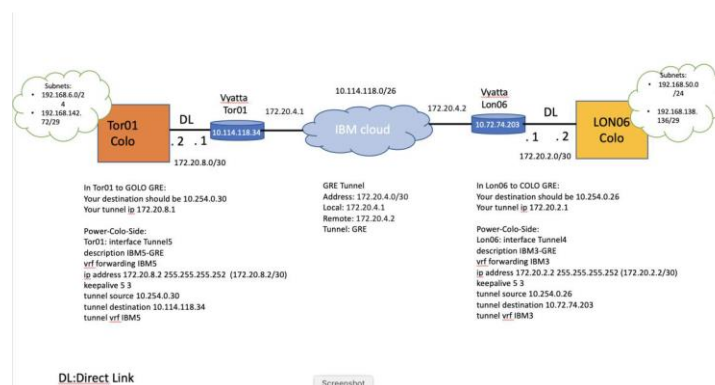
Select terms & condition (license agreements)

Then click on **Create** button.

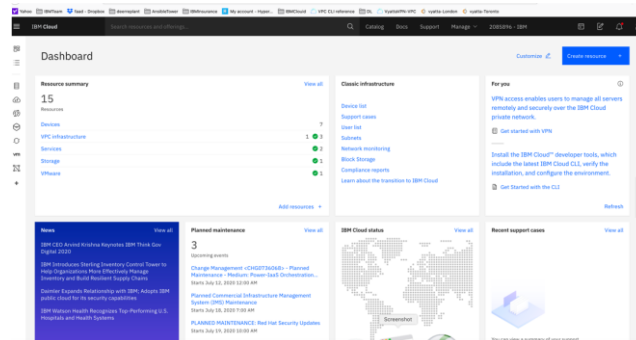
After you click on create, it will take some time to create the service.

DIAGRAMS:-

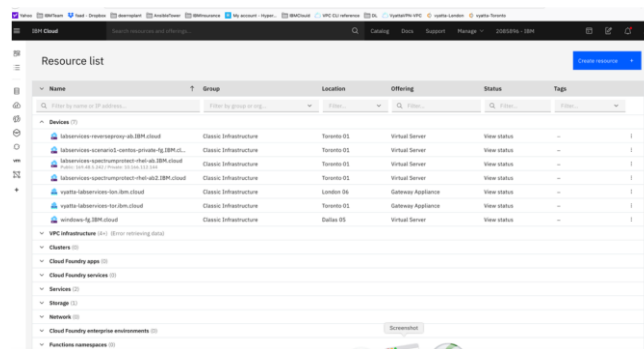
The overall architecture of our deployment is shown below:-



Login to IBM Cloud UI and press “IBM Cloud” on top left-hand side.

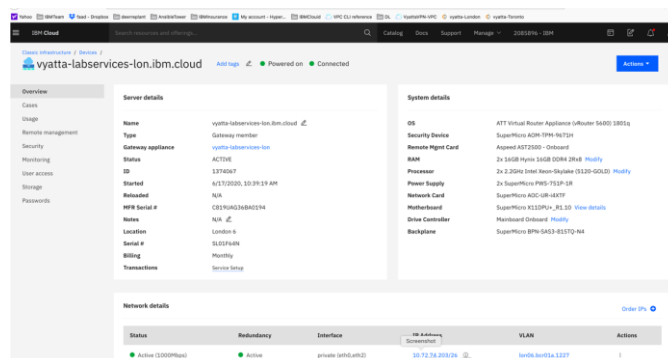


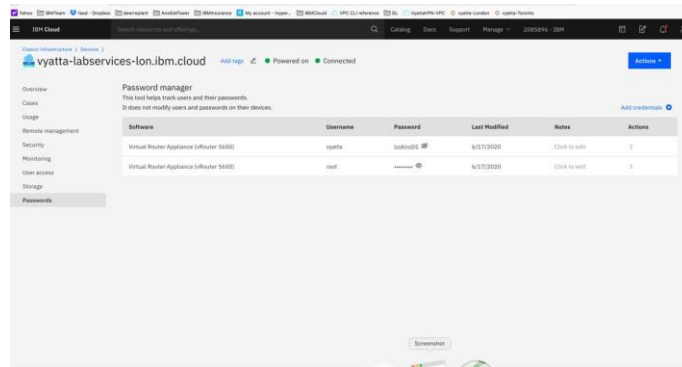
Click on “Devices”



LON06:-

Click on the London Vyatta: vyatta-labservices-lon.ibm.cloud





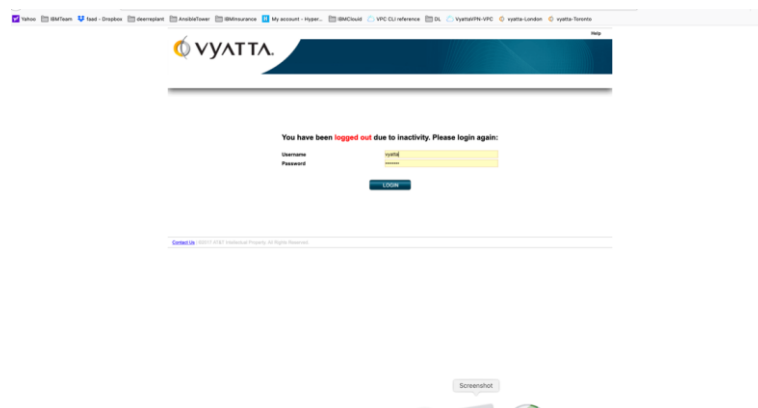
Open a browser and login to the Vyatta Gateway using:-

userID:- Vyatta

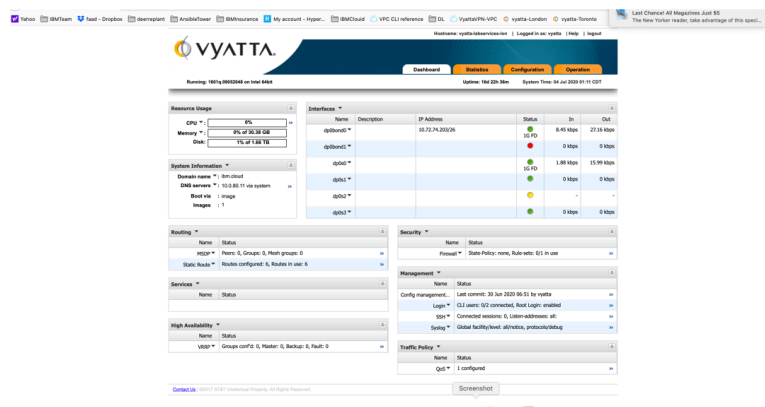
Password:- as show in the GUI

<https://10.72.74.203>

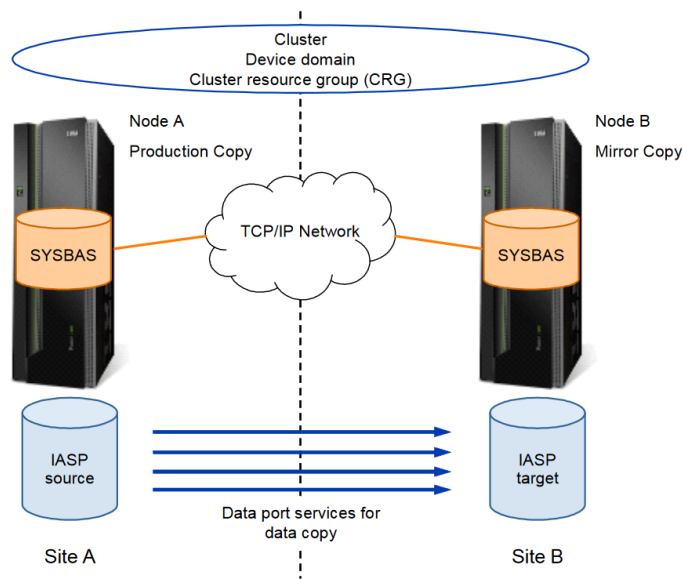
ssh [vyatta@10.72.74.203](https://10.72.74.203)



Login with the userID and password.



SOLUTION DIAGRAM:-



SOLUTION COMPONENTS AND REQUIREMENTS:-

COMPONENTS:-

This solution uses the following components:-

1. Open an IBM Cloud account
2. Create two Power PowerVS location Services and a private subnet in each PowerVS location.
3. Provision IBM i VSIs in each PowerVS location
 - a. A “production” IBM i cloud instance with an Independent ASP (IASP) that has been IASP-enabled (i.e. All changes/modifications allowing the IASP to function in a working environment should be completed before Geographic Mirroring is set up for a DR solution.)
 - b. A “DR” IBM i cloud instance with non-configured disks to be used for Geographic Mirroring. It is highly recommended that the number, type and capacity of disks match that of the production IASP.
4. Order Direct Link Connect Classic to connect each PowerVS location to IBM Cloud

5. Order two Vyatta Gateways one in each datacenter to allow for PowerVS location-to-location communication

6. Request a Generic Routing Encapsulation (GRE) tunnel to be provisioned at each PowerVS location.

7. Configure three GRE tunnels in the Vyatta Gateways. Two to connect Vyatta Gateway to the PowerVS location GRE tunnels created in Step 6 above and one across Vyatta Gateways to connect Vyatta-to-Vyatta. This will allow end-to-end PowerVS location-to-location communication for the VSIs in the PowerVS locations and to the IBM Cloud VSIs and other services such as Cloud Object Storage (COS) (if used).

8. Configure a Reverse-proxy Centos VSI to allow access to Private Cloud Object Storage endpoint from PowerVS location

PowerHA GEOGRAPHIC MIRRORING:-

When creating the IBM i instances via IBM Cloud Services, take note of the following recommendations in preparation for building the environments:-

Production IBM i Creation:-

- a. A general rule of thumb, assuming most production database objects are moved to the IASP, is a 1:3 ratio of SYSBAS volumes to IASP volumes. Much larger environments may see closer to a 1:6 or 1:9 ratio, as the size of SYSBAS does not need to grow at the same rate as the IASP.
- b. The names of the disks (from IBM Cloud Services) across ALL instances within that server must be unique. These names will not present themselves in the IBM i interface, but only be visible from the Cloud interface. This is why it is useful to keep track individually of the disk unit ID (from IBM i interface) and disk name (from Cloud interface) so you can assign your disks to the appropriate ASP. As noted above, these are best created at a later step in the process.
- c. Once the instance is created and Active, open the console and wait for the log-in screen. If the default image was deployed, the qsecofr password (QSECOFR) will be disabled and need to be changed

- d. Note that the line descriptions get created as CLOUDINITx names, and the TCP/IP interfaces are assigned to those automatically. The line descriptions are configured as **ONLINE(*YES)** and TCP/IP interfaces are configured as **AUTOSTART(*YES)** but can be changed to fit the needs of the business.

```

Work with Line Descriptions
System:  IBMIPROD
Position to . . . . . Starting characters
Type options, press Enter.
 2=Change  3=Copy  4=Delete  5=Display  6=Print  7=Rename
 8=Work with status  9=Retrieve source

Opt Line      Type      Text
--  ---      -
--  CLOUDINIT0 *ELAN
--  CLOUDINIT1 *ELAN
--  CLOUDINIT2 *ELAN

```

```

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

Opt  Internet      Subnet      Line      Line
   Opt Address      Mask      Description Type
--  ---
--  127.0.0.1      255.0.0.0  *LOOPBACK *NONE
--  192.168.6.118  255.255.255.0 CLOUDINIT0 *ELAN
--  192.168.142.74 255.255.255.248 CLOUDINIT1 *ELAN

```

Once TCP/IP is configured, the following changes are recommended:-

- CHGSYSVAL SYSVAL(QIPLTYPE) VALUE(1)

Note:- This will be changed back after DST/SST password is changed upon the next IPL.

- CHGSYSVAL SYSVAL(QLMTSECOFR) VALUE(0)
- CHGSYSVAL SYSVAL(QAUTOVRT) VALUE(100)

Note:- This can be any number desired, above zero.

- CHGTCPSVR SVRSPCVAL(*TELNET) AUTOSTART(*YES)
- CHGTCPSVR SVRSPCVAL(*FTP) AUTOSTART(*YES)
- CHGTCPSVR SVRSPCVAL(*SSHD) AUTOSTART(*YES)
- CHGTCPSVR SVRSPCVAL(*INETD) AUTOSTART(*YES)

IASP CREATION

To create the IASP, do the following:-

**CFGDEVASP ASPDEV(<IASP Name>) ACTION(*CREATE)
TYPE(*PRIMARY) PROTECT(*NO) ENCRYPT(*NO) UNITS(*SELECT)**

```
Configure Device ASP (CFGDEVASP)

Type choices, press Enter.

ASP device . . . . . > IASP          Name, *ALL
Action . . . . . > *CREATE          *CREATE, *DELETE, *PREPARE
ASP type . . . . . > *PRIMARY        *PRIMARY, *SECONDARY, *UDFS
Protection . . . . . > *NO           *NO, *YES
Encryption . . . . . > *NO           *NO, *YES
Disk units . . . . . > *SELECT       Name, *SELECT
                        + for more values
```

At any time, a matching device description can be created on the HA/DR node with the following:-

CRTDEVASP(<IASP Name>) RSRCTYPE(<IASP Name>)

```
Create Device Desc (ASP) (CRTDEVASP)

Type choices, press Enter.

Device description . . . . . > IASP          Name
Resource name . . . . . > IASP          Name
Relational database . . . . . > *GEN
Message queue . . . . . > *SYSOPR       Name
Library . . . . . >                     Name, *LIBL, *CURLIB
Text 'description' . . . . . > *BLANK
```

PowerHA Clustering Configuration:-

```
PowerHA Work with Cluster Nodes

Local node . . . . . : CLOUDPRD
Consistent information in cluster . . . : Yes

Type options, press Enter.
1=Add 2=Change 4=Remove 5=Display more details 6=Work with monitors
8=Start 9=End

Opt Node Status Device Domain
--
CLDDEVMN Active CLDDEVMN
CLOUDPRD Active CLDDEVMN
```

Adding Cluster Nodes to Device Domain:-

```
PowerHA                                Work with Device Domains

Consistent information in cluster . . . : Yes

Type options, press Enter.
  1=Add  6=Work with nodes  7=Work with switchable hardware

Opt  Device Domain      Number
-----Nodes-----
  6   CLDDEVDMN          2   CLOUDPRD CLOUDDR
```

```
PowerHA                                Work with Device Domain Nodes

Device domain . . . . . : CLDDEVDMN
Consistent information in cluster . . . : Yes

Type options, press Enter.
  1=Add  4=Remove

Opt  Node      Status
---  ---
  1   CLOUDDR   Active
  2   CLOUDPRD  Active
```

Creating the Device Cluster Resource Group (CRG):-

```
PowerHA                                Work with Cluster Resource Groups

Consistent information in cluster . . . : Yes

Type options, press Enter.
  1=Create  2=Change  3=Change primary  4=Delete  5=Display
  6=Recovery domain  7=Configuration objects  8=Start  9=End
  10=Configure

Opt  Container/CRG      Type      Status      Primary
-----
  6   CLDGEOMIR          *DEV      Active      CLOUDPRD
```

```
PowerHA                                Work with Recovery Domain

Cluster resource group . . . . . : CLDGEOMIR
Consistent information in cluster . . . : Yes

Type options, press Enter.
  1=Add node  4=Remove node  5=Display more details

Opt  Node      Status      Current Node Role  Preferred Node Role  Site Name
---  ---
  1   CLOUDDR   Active      *BACKUP 1          *BACKUP 1            TORONT02
  2   CLOUDPRD  Active      *PRIMARY           *PRIMARY             TORONT01
```


Add the IASP to the Device CRG:-

```
PowerHA                      Work with Cluster Resource Groups

Consistent information in cluster . . . : Yes

Type options, press Enter.
  1=Create   2=Change   3=Change primary   4=Delete   5=Display
  6=Recovery domain  7=Configuration objects  8=Start    9=End
 10=Configure

Opt      Container/CRG      Type      Status      Primary
 7      CLDGEOMIR          *DEV      Active      CLOUDPRD
```

```
PowerHA                      Work with Configuration Objects

Cluster resource group . . . . . : CLDGEOMIR
Consistent information in cluster . . . : Yes

Type options, press Enter.
  1=Add   2=Change   4=Remove   5=Display more details
  6=Configuration status

Opt      Configuration Object Name      Object Type      Device Type      Device Subtype      Vary Online
-      IASP01                          *DEV            *ASP             Primary             *ONLINE
```

START GEOGRAPHIC MIRRORING OF THE IASP:-

From the Production IBM i instance, do the following to start Geographic Mirroring on the IASP:-

1. **CFGGEOMIR ASPDEV(<IASP Name>) ACTION(*CREATE) SSN(<DR Site ASP Copy>/<Prod Site ASP Copy>/<ASP Session Name>) DELIVERY(*ASYNC) UNITS(*SELECT).**

Press Enter.

```
Configure Geographic Mirror (CFGGEOMIR)

Type choices, press Enter.

ASP device . . . . . > IASP          Name
Action . . . . . > *CREATE          *CREATE, *DELETE
Source site . . . . . TORONTO1      Name, *
Target site . . . . . TORONTO2      Name, *
Session . . . . . CLDGEOMIR         Name, *NONE
Source ASP copy description . CLOUDPRD Name
Target ASP copy description . CLOUDDR Name
Transmission delivery . . . . *ASYNC *SYNC, *ASYNC
Disk units . . . . . *SELECT       Name, *SELECT
+ for more values
```

```

PowerHA                                Work with ASP Copy Descriptions          IBMIPROD
                                          07/16/20 09:31:52
Device domain . . . . . : CLDDEVDMN

Type options, press Enter.
  1=Add copy      2=Change copy      4=Remove copy      5=Display copy
 21=Start session 22=Change session 24=End session     25=Display session

Opt   ASP      ASP      ASP      Session
     Device    Copy      Session  Type
-----
25    IASP01    CLOUDPRD  CLDGEOMIR  *GEOMIR
     IASP01    CLOUDDR   CLDGEOMIR  *GEOMIR

```

```

PowerHA                                Display ASP Session          IBMIPROD
                                          07/16/20 09:38:08
Session . . . . . : CLDGEOMIR
Type . . . . . : *GEOMIR

Source node . . . . . : CLOUDPRD
Target node . . . . . : CLOUDDR
Transmission Delivery . . . . . : *ASYNC

Copy Descriptions
ASP      ASP      Role      Vary      Replication      Data
Device  Copy      State     State     State           State
IASP01  CLOUDPRD  PRODUCTION AVAILABLE  ACTIVE          USABLE
        CLOUDDR  MIRROR    VARYON

```

More...

Press Enter to continue

Bottom

F3=Exit F5=Refresh F11=View 2 F12=Cancel F19=Automatic refresh

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