

Understanding TS7700 Object Store for z/OS Data

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Session **3AJ**



Introduction

Mainframe Backup and Archive

Efficiency, Consistency, Complementary

IBM Z15



- Information Lifecycle Management
- Focused solely on policy based decision making

IBM DS8900F



- Primary Storage
- Data Movement

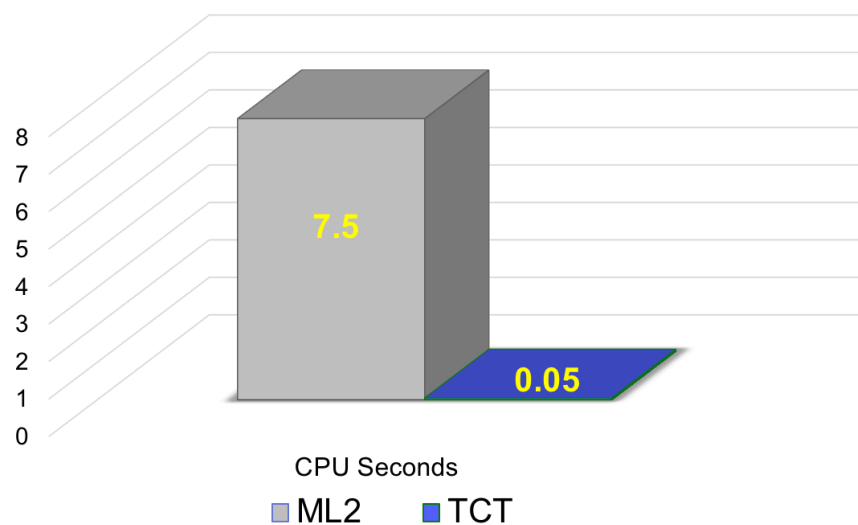
IBM TS7770



- Archive and Backup Storage
- Tape and now Object

z/OS Transparent Cloud Tiering with DS8880 / DS8900F

- IBM Z CPU efficiencies via allowing the DS8000 move the data instead of the host
 - Full integration with DFSMSHsm and DFSMSdss
- Data is moved with Ethernet, TCP/IP directly from DS8000 to the object storage
 - No additional feature code required on the DS8000 (part of zSynergy Feature Bundle)
- S3 compatible object storage supported
- **NEW** – *TS7700 can now be used as an object store for this solution*
 - Allows for coexistence of FICON tape workloads with TCT object workloads on the same TS7700
- **More Encryption, Compression and new extended use cases for TCT available today**



IBM Z



IBM DS8900F
or DS8880

Transparent
Cloud Tiering

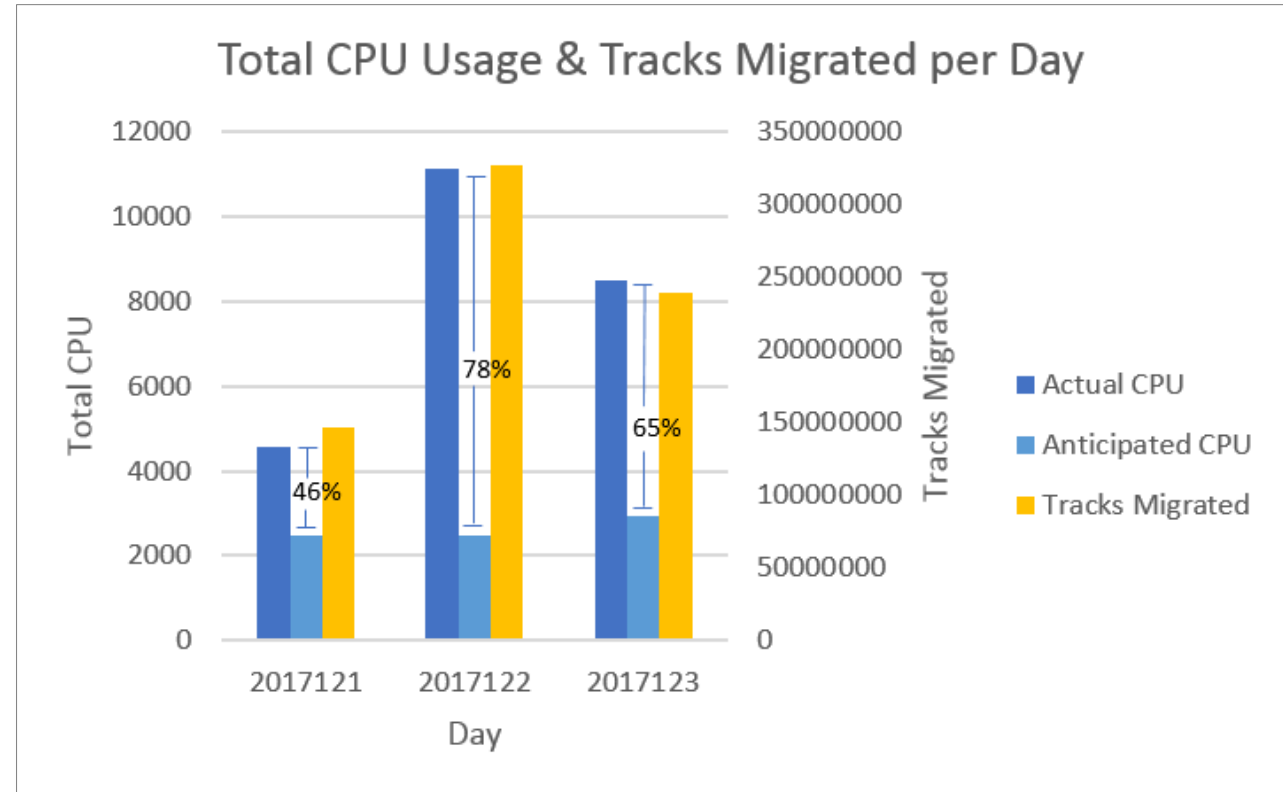


Estimation for Daily PSM CPU reduction

Total reported CPU compared
against an **estimated** CPU:
(.05 seconds * # data sets)



*Remember, reduction is based on
the size of the data being moved.
Clients with mostly small data sets
will see modest reductions.*



*Based on approximations from preliminary internal IBM data measurements. Results **will** vary by customer based on particular workloads, configurations and software levels applied.*

<ftp://public.dhe.ibm.com/eserver/zseries/zos/DFSMS/HSM/zTCT/>

Cloud Objects within the Object Store

- TCT stores datasets and dumps as individual objects, not as logical tape volumes.
- DFSMSHsm considers objects a separate tier versus ML1, ML2 (Migration Level CLOUD)
 - VOLSERs are modified to MIGRATC
- Datasets and dumps are a collection of objects : metadata and customer data are split
 - Allows for future work with analytics, data sharing, and further tiering

DCSDMC01.GDG.V12S.G0001V00/APPMETA

DCSDMC01.GDG.V12S.G0001V00/DTPDSHDR

DCSDMC01.GDG.V12S.G0001V00/DTPVOLD01/NVSM/META

DCSDMC01.GDG.V12S.G0001V00/DTPVOLD01/NVSM/EXTENTS

VS.

VOLSER
Z20022

Use Case Summary

Take advantage of Transparent Cloud Tiering efficiencies with a greater set of use cases

Targeted DFSMShsm Automatic Dataset Migration

Set Management Class policies to automatically migrate datasets using TCT

DB2 Image Copies

DB2 offline point-in-time copies using DSS FlashCopy followed by MIGRATE STORAGEGROUP

DSS Dataset Disk Backups

Create DSS data set backups to HSM managed storage groups

Native DSS Full Volume Dump Support

Leverage DSS natively to offload full volume dumps to object storage

DSS Full Volume Dump (GA), HSM Full Volume Dump (Statement of Direction)



Flashcopy, Full Volume Dump to the cloud

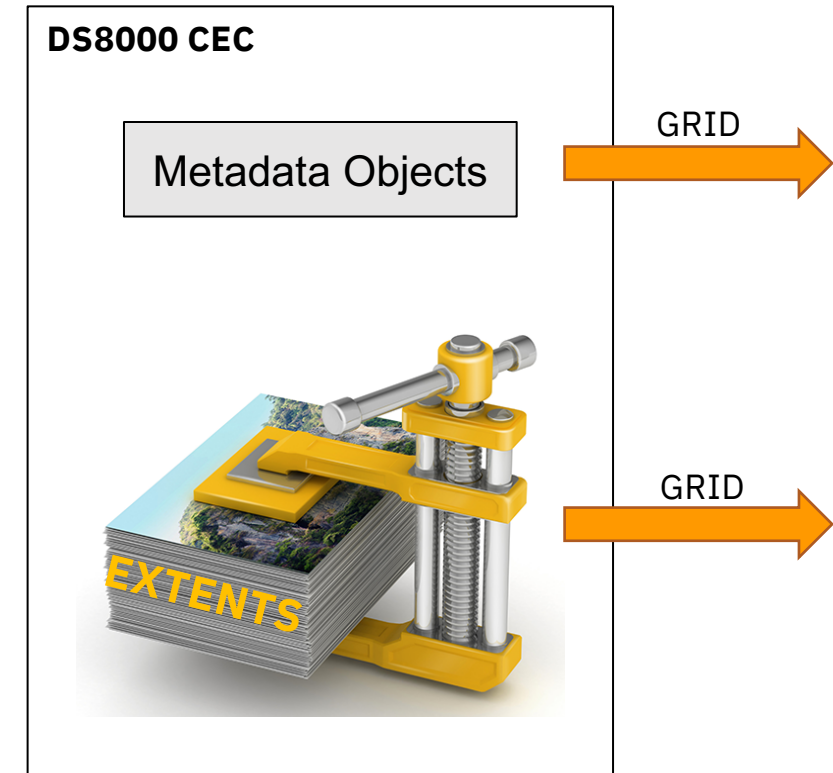
Create DSS full volume dumps via FlashCopy and use DSS (GA) or HSM (SOD) move to the cloud

Restore directly to the source



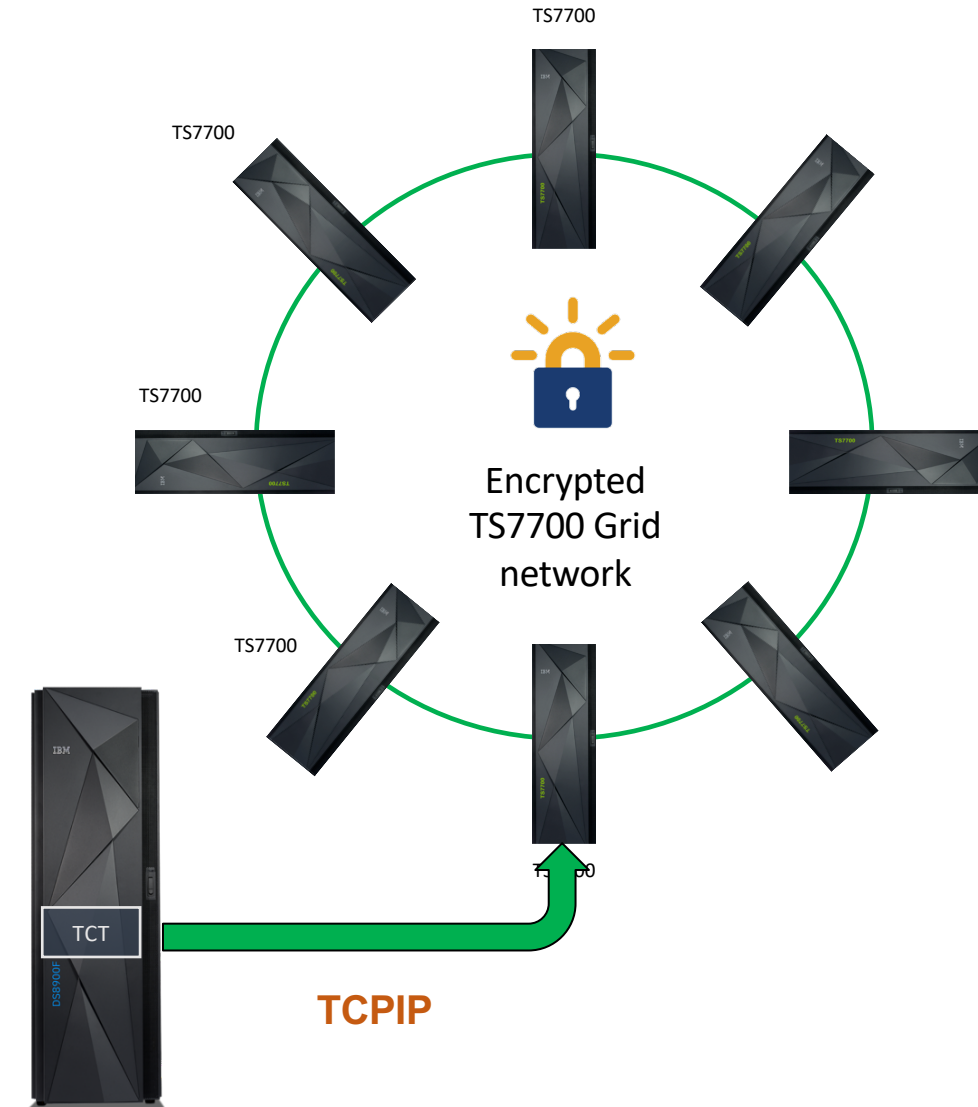
TCT Compression with TS7700 as an Object Store

- Support requires DS8900F R9.1 microcode and z/OS APARS
 - No co-req with TS7700 microcode
 - No additional feature codes
- Only supported when TS7700 is configured as the object store
- Only customer data is compressed
 - Metadata objects are not compressed
 - Data lands in TS7700 compressed and is only uncompressed when recalled back in DS8900F
- Hardware accelerated compression is done within the DS8900F
 - Uses built-in compression accelerator in POWER9
- DFSMS controls the use of compression
 - Will avoid compression if the dataset is host compressed/encrypted
 - z/OS APAR: OA59465



TCT Secure Data Transfer with TS7700 as an Object Store

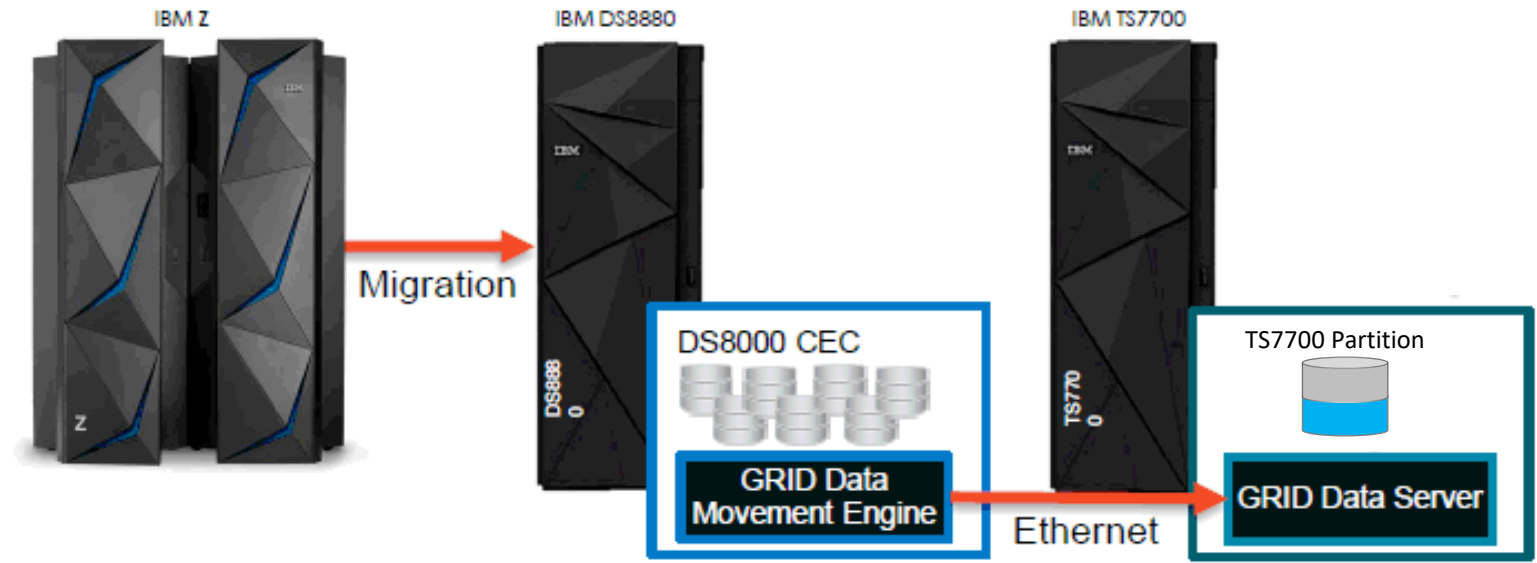
- Support requires DS8900F R9.1 microcode
 - No co-req with newer TS7700 Microcode (R5.0) and z/OS APARS
 - Requires FC 5281 installed on the TS7700
- Uses the SDT capability in the GRID movement engine embedded within the DS8900F
 - AES 256-bit TLS 1.2 Encryption over Ethernet TCP/IP
 - Hardware accelerated via POWER9 crypto engine to offload CPU from DS8k
- Encryption of data in flight only
 - Decrypted when it arrives in the TS7700 cluster
 - Encrypts all data, whether compressed or host encrypted



TS7700 as an Object Store

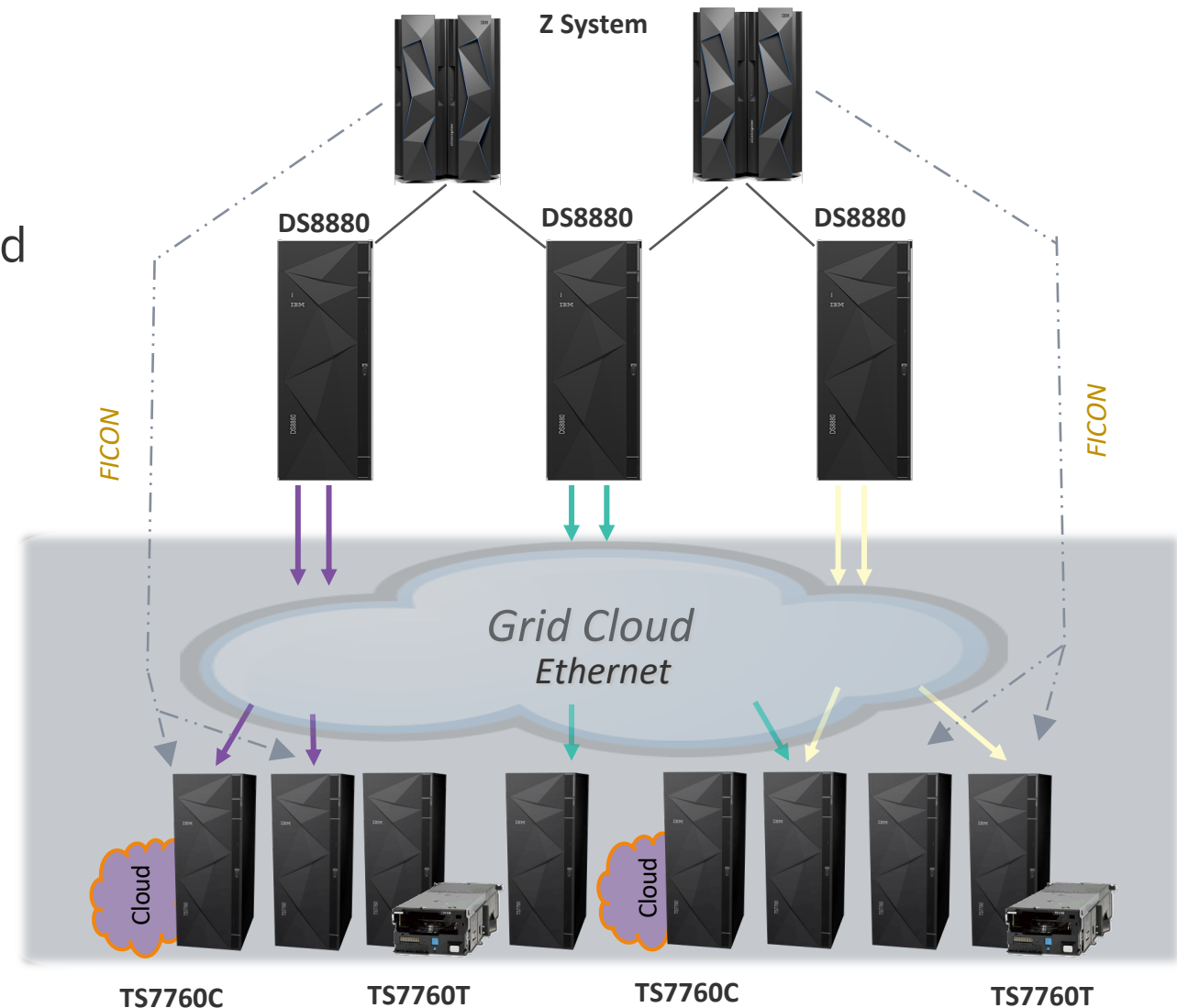
Transparent Cloud Tiering with TS7700 as Object Store

- TS7700 as a target object store
- Supports TS7760/TS7770 Virtual Tape and DS8880/DS8900 Disk systems
- Intermix existing FICON tape workloads and TCT Object workloads to the same TS7700
- Data flows from DS8000 to TS7700 via GRID network links
- Utilizes logical partitions dedicated to TCT objects
- Supports data redundancy via writing to two TS7700 clusters within the same GRID

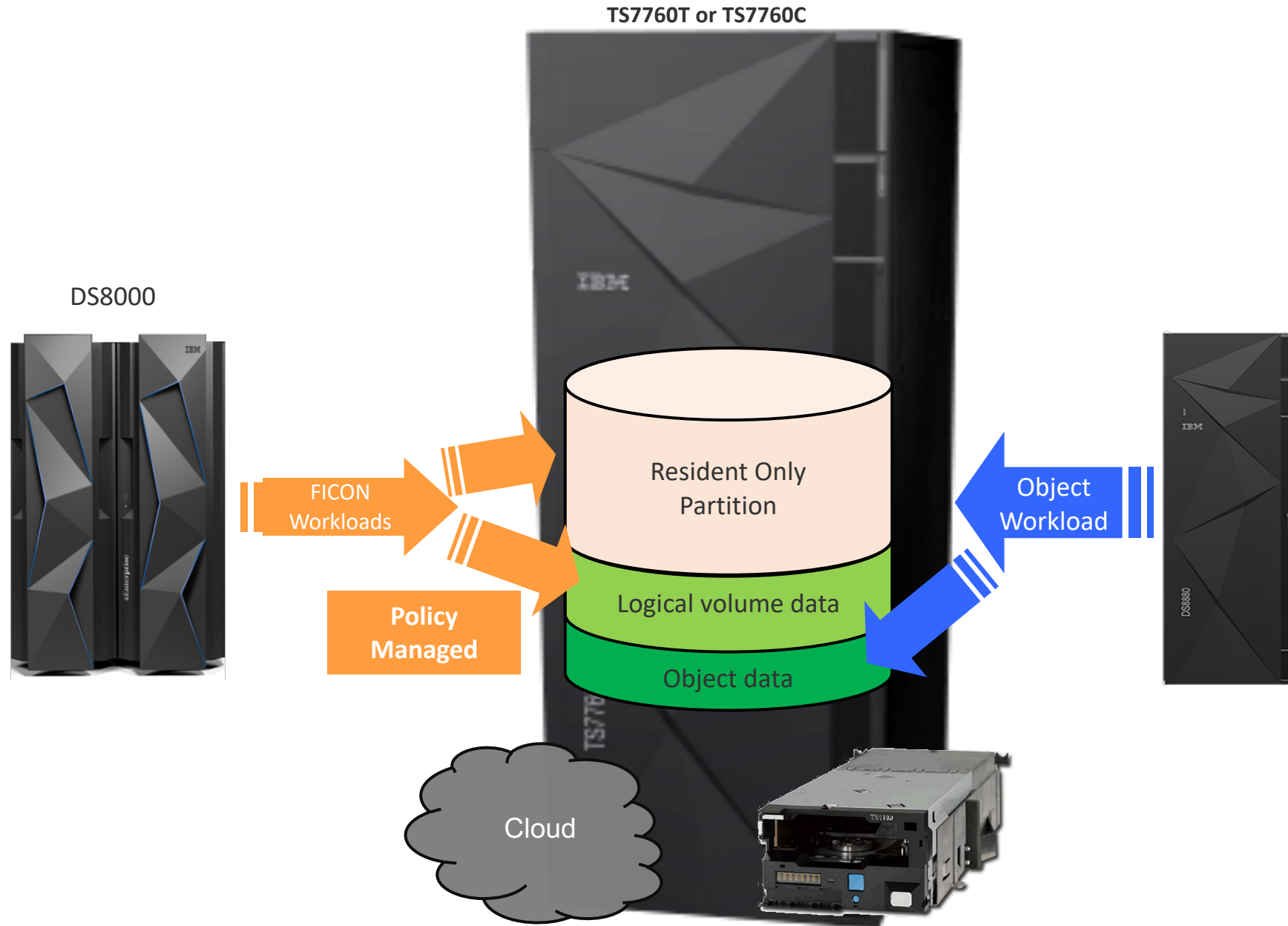


More on TCT with TS7700 Object Store

- Co-existence with up to 8-way GRIDs
- TS7700 can be tapeless, tape attached, or cloud attached.
- Objects cannot be migrated to tape or cloud.
- Support multiple DS8Ks connect to a TS7700
- Uses existing cache. MES of additional cache not required



Logical Cache Partition for Objects



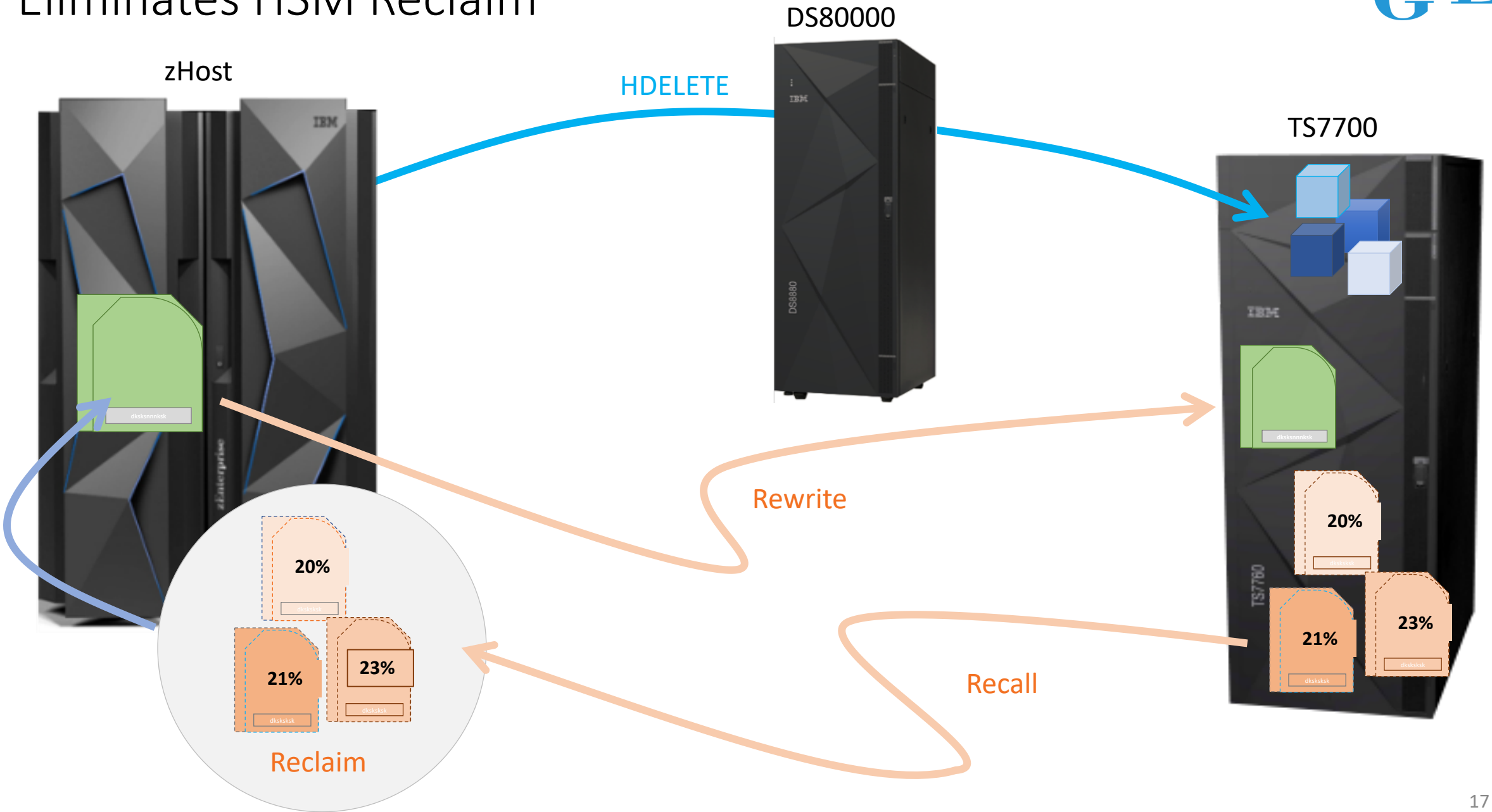
- Utilizes existing TS7700 Logical Cache Partitioning
- Separates FICON logical volume data from object data
- Coexists with Tape or Cloud logical volume partitions
- Allocates from Cache Partition 0 (Resident only partition) and returns to CP0

Parallel Access Objects



- Allows for parallelism of object retrieval and store
 - Eliminates serial access to tape

Eliminates HSM Reclaim



Requirements for DS8000 TCT with TS7700 as an Object Store

- **DS8880 and DS8900 supported (all models)**

- Part of the zSynergy License Bundle
- DS8880 R8.5SP4.1 minimum level
- DS8900 R9.0SP1 minimum level
 - R9.1 required for encryption/compression to TS7700
- Ethernet connections
 - Note: DS8900 10Gb Ethernet CANNOT direct connect to TS7700 GRID adapters (SR vs. LR connectivity). DS8880 10Gb Adapters can direct connect.



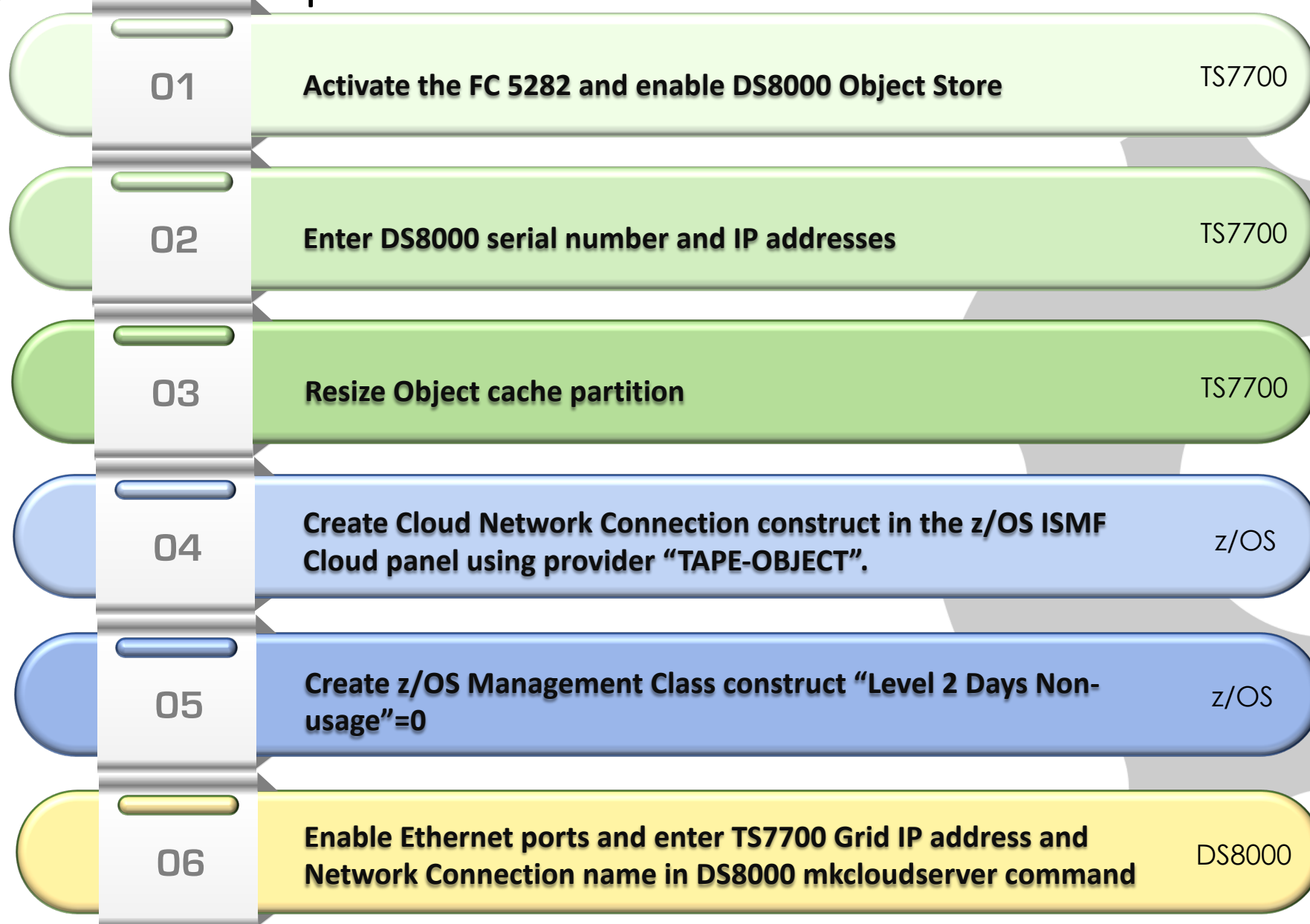
- **TS7760 (VEC) and TS7770 (VED) supported**

- Minimum code level is R5.0
- Feature Code #5282
- Uses existing GRID adapters and will share TCPIP traffic with the GRID

- **z/OS V2R3 and V2R4 supported**

- APARs required to enable "Tape Object" type in SMS Cloud Construct/Network Connection panel, DS8K compression support and DFSMSdss Full Volume Dump

Easy Setup Steps



Object Cache Partition

- Object Cache Partition now visible on the TS7700 MI (tapeless)
- New object partition will now exist - created during Enable process
- Resize partition
- Object Count

The screenshot displays the LLREQ Command interface. At the top right, it indicates 'Last Refresh: Mar 4, 2019, 2:48:20 PM'. Below this is a table with columns: Partition, Name, Used, Capacity, Volumes, and Objects. The table contains two rows: '0 Volume Resident Partition' and '1 Object Partition'. The 'Object Partition' row shows '2.18 TB' used and '120 TB' capacity. To the left of the table is a vertical toolbar with icons for various system functions. At the bottom, there are three status bars: 'Physical Cache 2.18 TB / 191.8 TB (1%)', 'Copy Queues 0 | 0 GiB', and a green 'Health' indicator.

Partition	Name	Used	Capacity	Volumes	Objects
0	Volume Resident Partition	0.01 TB	71 TB	2999	0
1	Object Partition	2.18 TB	120 TB	0	7975

Physical Cache 2.18 TB / 191.8 TB (1%) Copy Queues 0 | 0 GiB Health

Library Request CACHE2

```
> SHOWING RESULTS FOR COMMANDS: CACHE2
"TAPE VOLUME CACHE STATE V5 .0"
"TOTAL SPACE INSTALLED/ENABLED: 191TB/ 191TB"
"TOTAL ADJUSTED CACHE SPACE USED: 1044GB"
"CACHE ENCRYPTION STATUS: CAPABLE"
"OVERCOMMITTED CACHE PARTITIONS: NONE"
"CACHE RESIDENT ONLY PARTITION"
" PRIVATE CACHE SPACE USED: 1042GB"
" SCRATCH CACHE SPACE USED: 0.0GB"
" CP ALLOC USED PIN PKP PRM COPY CPYT"
" 0 70.8TB 1042GB 0.0GB 1042GB 0.0GB 0.0GB 0"
" FLASH COPY INFORMATION"
" INDEX ENABLED SIZE"
" 1 NO 0.0GB"
" 2 NO 0.0GB"
" 3 NO 0.0GB"
" 4 NO 0.0GB"
" 5 NO 0.0GB"
" 6 NO 0.0GB"
" 7 NO 0.0GB"
" 8 NO 0.0GB"
"TIERED CACHE PARTITIONS"
" CP TCO ALLOC USED PG0 PG1 PMIGR D_PMIGR COPY PMT CPYT"
" 1 NNY 121TB 2189GB 0.0GB 2189GB 0.0GB 0.0GB 0.0GB 0 0"
" 2 NNN 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0 0"
" 3 NNN 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0 0"
" 4 NNN 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0 0"
" 5 NNN 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0 0"
" 6 NNN 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0 0"
" 7 NNN 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0.0GB 0 0"
> EXECUTING COMMANDS: CACHE2
```

Displays the partition type and cache utilization statistical information

Library Request SETTING2, RSDOLOW/RSDOHIGH

```
> SHOWING RESULTS FOR COMMANDS: SETTING2
"SETTING2 V4 .0"
" SCRATCH CONTROLS"
" PFRLOCO = ENABLED"
"-----"
" ALERTS"
" PDRVSLOW = 0 PDRVSCRT = 0"
" LMTDTHR = 0"
" CAGALOW = 0 CAGAHIGH = 0"
" CAGLOW = 0 CAGHIGH = 0"
" RSDOLOW = 1000 RSDOHIGH = 10000"
"-----"
" CACHE CONTROLS"
" MAXLGMC = 128"
" OVRSPVLV = 2000"
"-----"
... . .
```

- New settings RSDOLOW and RSDOHIGH
- LI REQ SETTING2 - Displays current settings
- LI REQ SETTING2,RSDOHIGH,<value GB> - High warning limit of resident data in the object partition
- LI REQ SETTING2,RSDOLOW,<value GB> - Low warning limit of resident data in the object partition

Library Request STATUS,GRLNKACT

```
"GRLNKACT STATUS V2 .0"
"CLUSTER INDEX: 1 LINK COUNT: 4 Time: Wed Feb 27 00:04:15 CUT 2019"
"GRID LINK ESTABLISHED SOCKET CONNECTIONS-----"
"LN INTF IP C0 C1 C2 C3 C4 C5 C6 C7 MQ RFA CLD"
"L0 en8 9.11.219.164 0 0 55 0 0 0 0 56 111 0 0"
"L1 en10 9.11.219.165 0 0 0 0 0 0 0 0 0 0 0"
"L2 en9 9.11.219.169 0 0 0 0 0 0 0 0 0 0 0"
"L3 en11 9.11.219.170 0 0 0 0 0 0 0 0 0 0 0"
"LN INTF IP GGM OBJ"
"L0 en8 9.11.219.164 0 0"
"L1 en10 9.11.219.165 0 0"
"L2 en9 9.11.219.169 0 0"
"L3 en11 9.11.219.170 0 0"
"NET ACTIVITY -----TCP RECV/SEND ADAPTER BUFFER ACTIVITY BYTES-----"
"LN TxMBs RxMBs MQ_REC MQ_SND GFA_REC GFA_SND CLD_REC CLD_SND"
"L0 0 0 0 0 0 0 0 0"
"L1 0 0 0 0 0 0 0 0"
"L2 0 0 0 0 0 0 0 0"
"L3 0 0 0 0 0 0 0 0"
"TOT 1 1 - - - - -"
"LN GGM_REC GGM_SND OBJ_REC OBJ_SND"
"L0 1 1 1 1"
"L1 0 0 0 0"
"L2 0 0 0 0"
"L3 0 0 0 0"
"TOT 1 1 1 1"
"GRID LINK THROUGHPUT ESTIMATES-MB/s-----"
"DIR C1 C2 C3 C4 C5 C6 C7 GRD_TOT CLD GGM OBJ TOT"
"Tx 0 0 0 0 0 0 0 0 0 0 0 01234567"
"Rx 0 0 0 0 0 0 0 0 0 0 0 0"
```

New command added in R4.2.
Grid link point-in-time activity.

Add new columns for data for
Objects

<--C0 doesn't show since it is the local

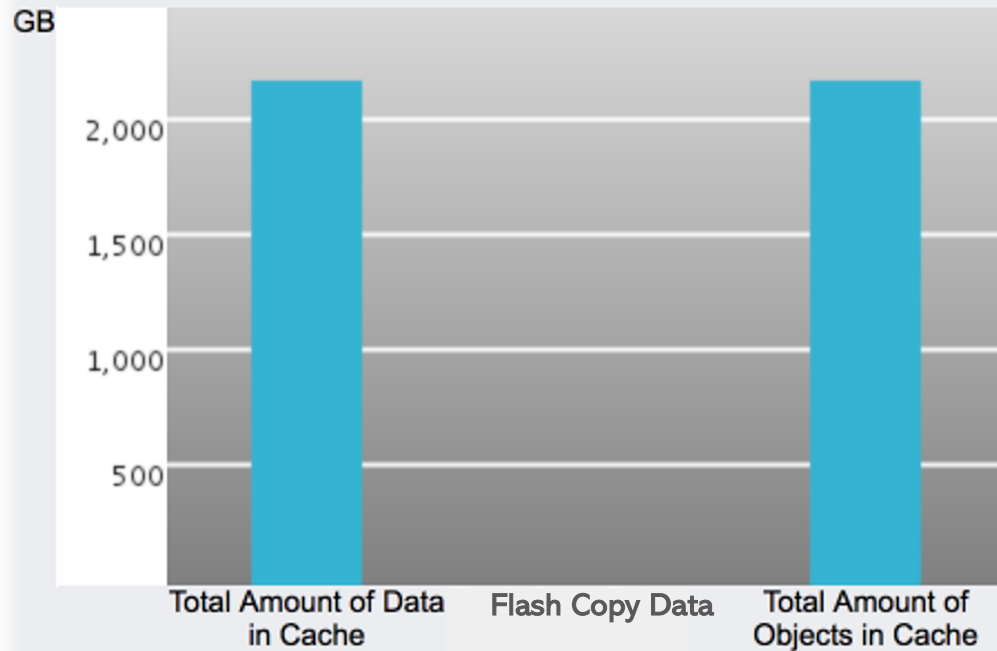
TS7700 Management Interface Changes

"Cluster[0]" (#BA74A): Cache Utilization

Refresh Last Refresh: Mar 4, 2019, 6:51:03 PM

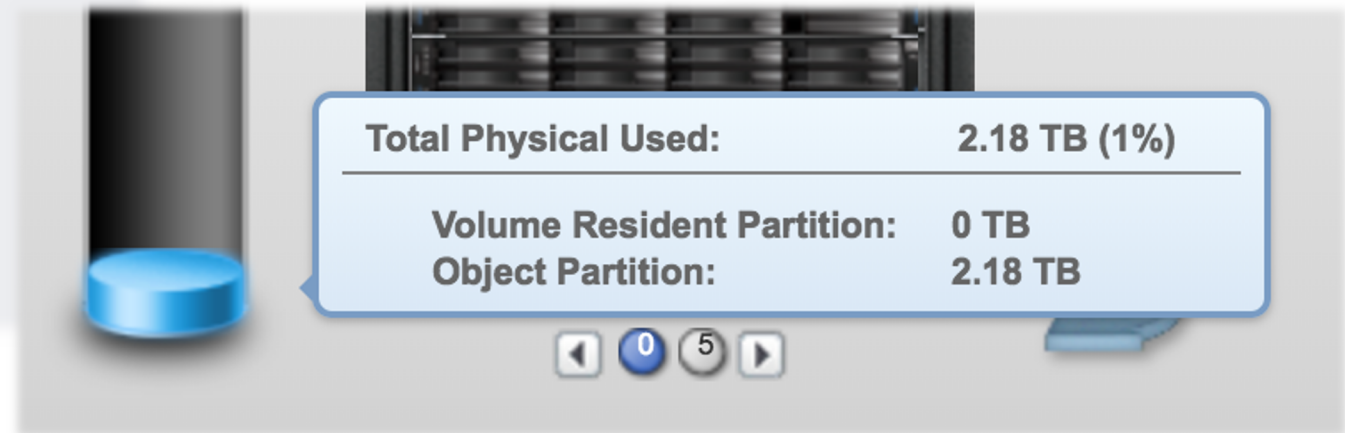
Select cache utilization statistics:

Total amount of data in cache: ▾

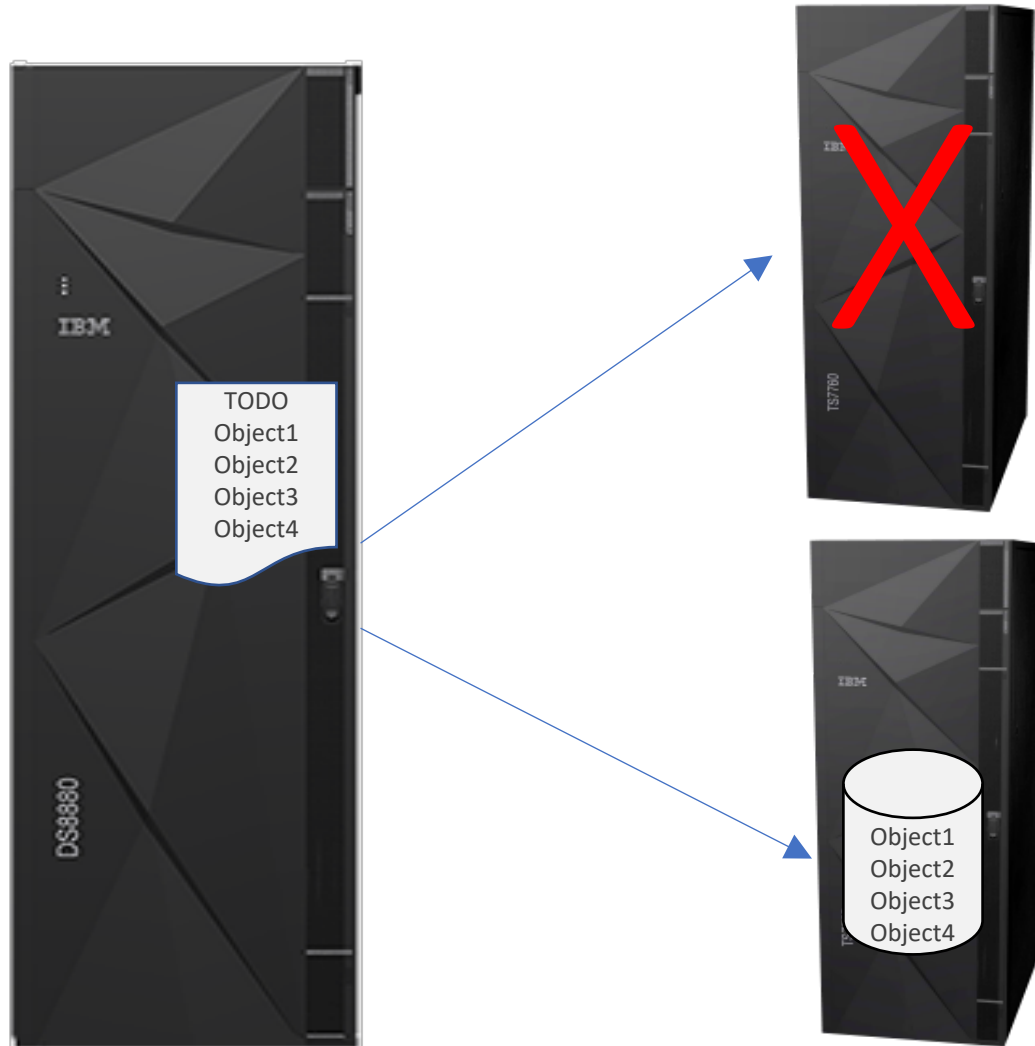


Total amount of data in cache: 2,184 GB (2,034 GiB) 1%
Total amount of data in cache from flash copies: 0 GB (0 GiB) 0%
Total amount of data in cache from Objects : 2,184 GB (2,034 GiB) 1%

- Cache Utilization
- Object Count
- Historical Statistics
- Grid link throughput



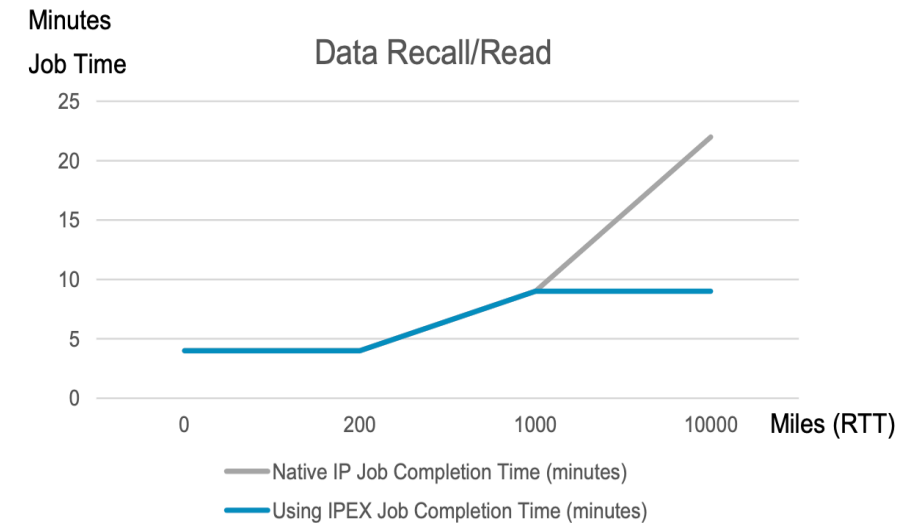
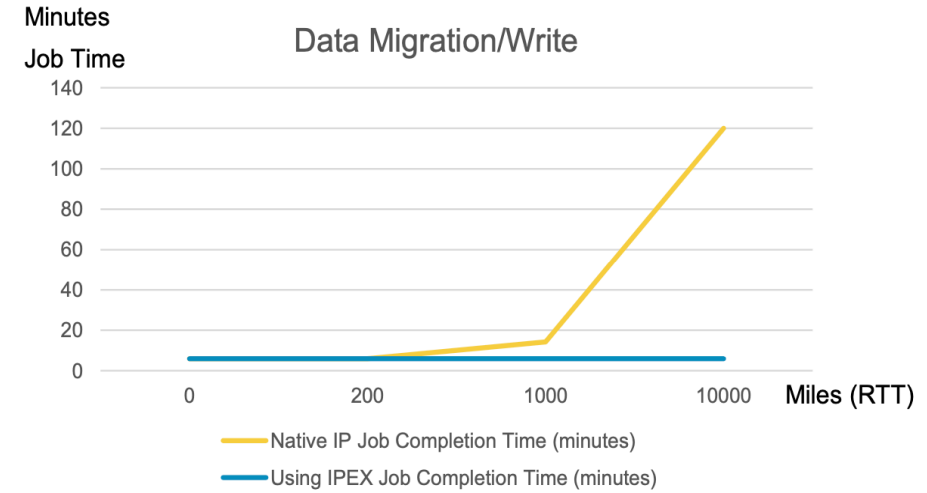
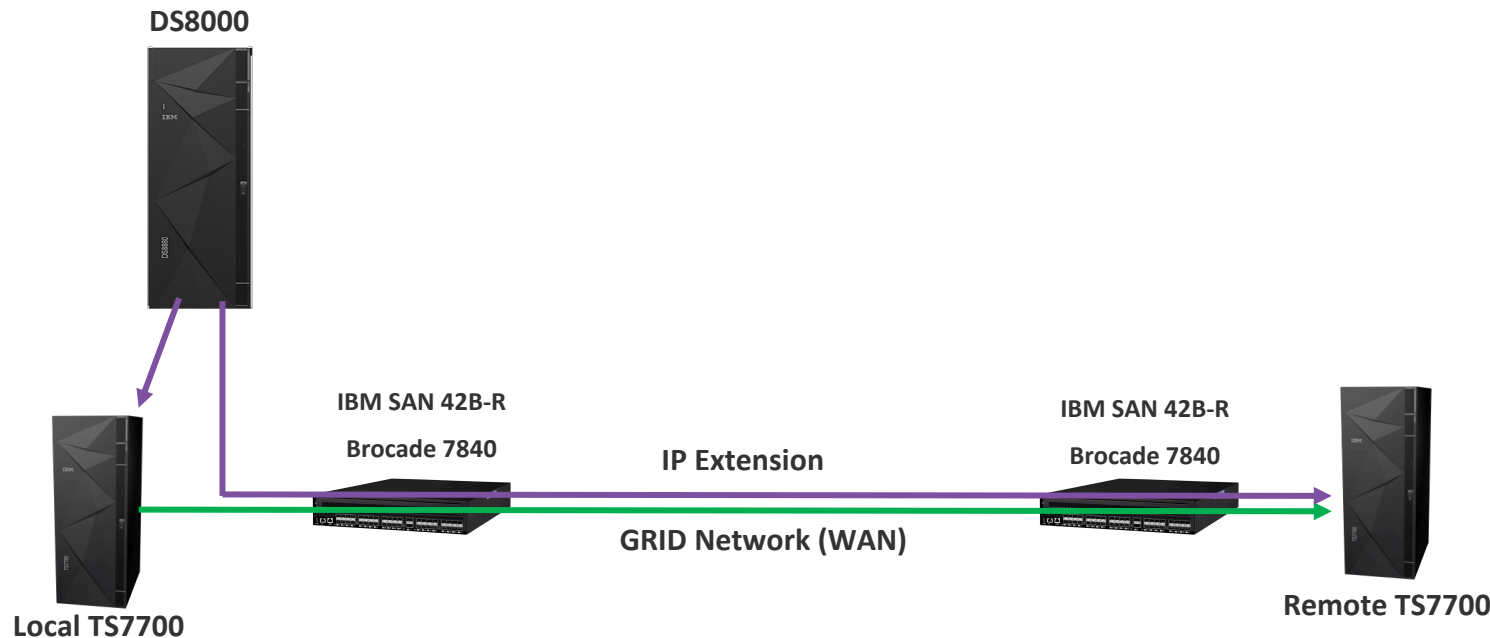
DS8000 Object Store - Object Data Resync/Recovery



In the event a TS7700 becomes unavailable, DS8K will track transactions not written to the unavailable cluster and automatically synchronize the data once the cluster becomes available.

TCT, TS7700, GRID and DR Distance

- Planning to use synchronous writes for data redundancy?
- Planning on one of those TS7700 Clusters to be at the remote site?
- Use existing IP Extension options to eliminate latency, just like GRID to remote locations today



DFSMsds Full Volume Dump and Restore

DFSMSdss Full Volume Dump

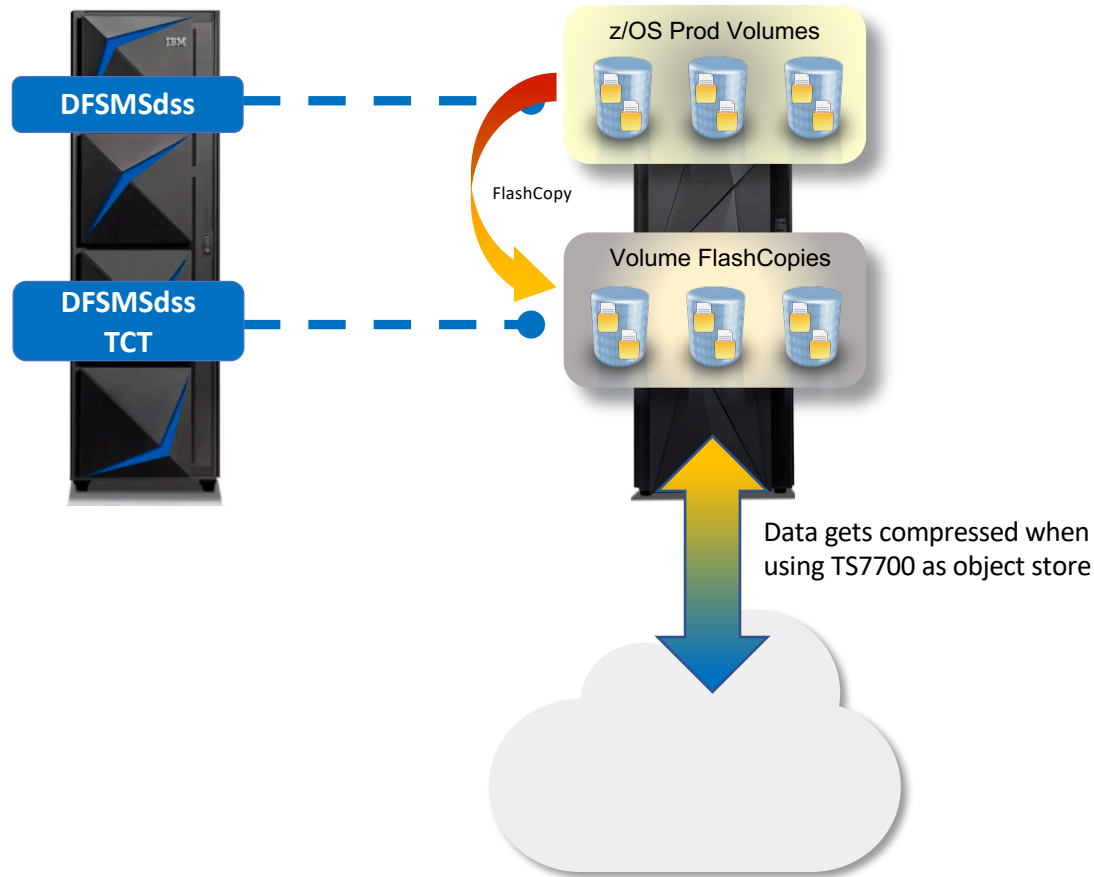
Full Volume Dump expands possible use cases for backup of active data using tct

Enables storage administrators to dump z/OS volumes to an object storage cloud as well as recover a volume from an object storage cloud

Supported for both TS7700 as an object store as well as traditional object stores

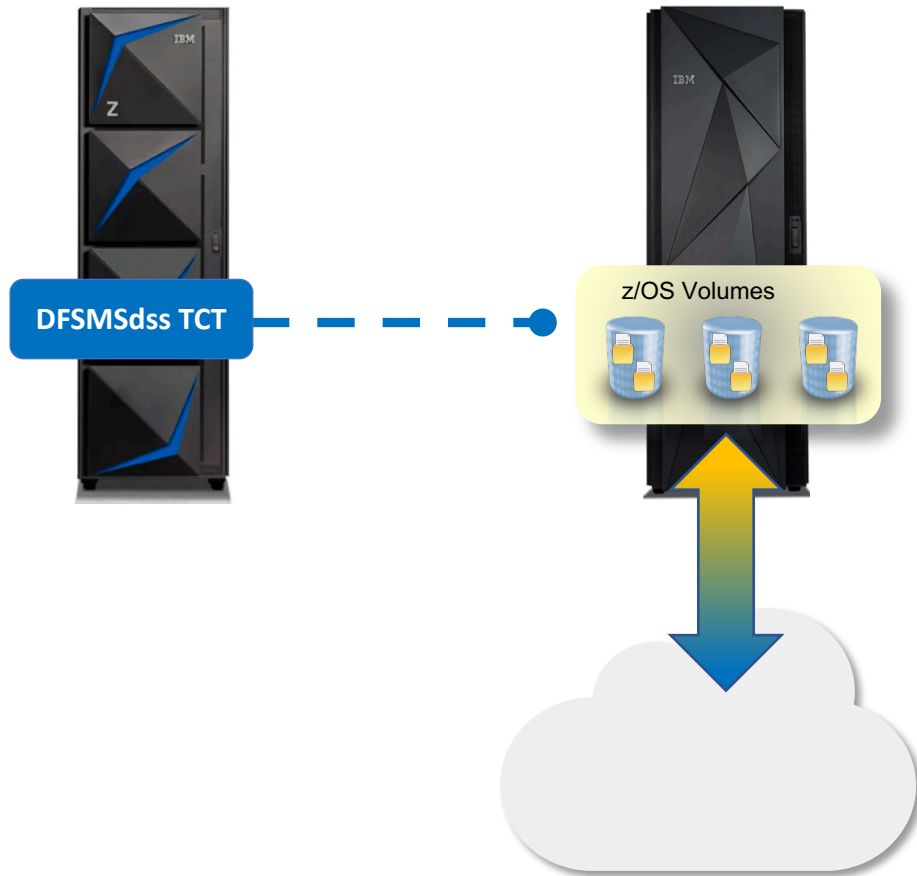
Utility commands, list and delete, added to assist in managing full volume dumps

New Support – Native Full Volume Dump



- ★ Create Pit Volume Copies using DFSMSdss and FlashCopy with DumpConditioning
- ★ DFSMSdss command-based dump to cloud
- ★ Volume dump in cloud looks as if the dump was taken directly from the z/OS production volumes (not the intermediate volume)

New Support – Restoring from Cloud



- ★ Volume can be restored directly back to production volume
- ★ Can be restored to a different volume on a different LPAR forensic analysis

Removing the Roadblocks

Three inhibitors to using DFSMSdss natively up until now were:

- Account credentials were exposed in JCL
 - New CDACREDS keyword and method to store encrypted password in z/OS Unix filesystem for use by DFSMSdss at runtime
 - CDACREDS is supported for DUMP, RESTORE, and the CLOUDUTILS commands
- Objects are not cataloged
 - New CLOUDUTILS LIST command to allow lookup of dumps created in the cloud
 - Store joblogs in GDGs to keep track of successful dumps to be used as reference for recovery
- No automatic management or expiration of dumps created in the cloud
 - New CLOUDUTILS DELETE command to allow deletion of dumps created in the cloud

Inventory Management

- ***CLOUDUTILS LIST***

- *Lists one ore more dumps in a container or all the dumps in a container*
- *Access to the CLOUDUTILS LIST command requires at least read access to STGADMIN.ADR.CLOUDUTILS facility class profile*

Object Expiration

- **CLOUDUTILS DELETE**

- *Deletes one or more dumps in a container or deletes an entire container*
- *Access to the CLOUDUTILS DELETE command requires at least read access to STGADMIN.ADR.CLOUDUTILS.DELETE facility class profile*
- *Deleting non-empty containers with CLOUDUTILS DELETE FORCE requires at least read access to STGADMIN.ADR.CLOUDUTILS.FORCE facility class profile*

Using TCT for full volume dumps

Suppose you want to create nightly dumps of a volume and keep one week's worth of dumps

Within the dssdumps container we have a week's worth of backups for vol001

Use the ISPF file tailoring service and REXX to generate JCL that will be run nightly

DFSMSdss JCL Skeleton

```
//DNIGHTLY JOB...
//DUMP EXEC PGM=ADRDSSU
//PRODVOL DD UNIT=SYSDA,DISP=SHR,VOL=SER=&PRDVOL
//FLCVOL DD UNIT=SYSDA,DISP=SHR,VOL=SER=&FLCTGT
//SYSPRINT DD SYSOUT=A
//SYSIN DD *
COPY FULL INDDNAME(PRD001) OUTDDNAME(FLCVOL) -
ALLDATA(*) ALLEXCP -
FCNOCOPY FCTOPPRCP(PresMirReq) DUMPCONDITIONING

IF LASTCC = 0 THEN
DUMP FULL INDDNAME(FLCVOL) FCWITHDRAW -
ALLDATA ALLEXCP(*) -
CDACREDS CLOUD( &CLOUD ) CONTAINER( &CONTNER ) -
OBJECTPREFIX( '&JOBNAME/&PRDVOL/D&STODAY' )

IF LASTCC = 0 THEN
CLOUDUTILS DELETE -
CDACREDS CLOUD( &CLOUD ) CONTAINER( &CONTNER ) -
OBJECTPREFIX( '&JOBNAME/&PRDVOL/D&SEXPIRE' )

/*
```

It is up to you to choose an object prefix naming convention

Use symbols to create an object prefix naming convention that will allow for multiple backups, and multiple versions of a backup, in the same container

Using a date in the object prefix is one way to allow for multiple versions of the same backup

File Tailoring

We need a way to delete old dumps based on our retention policy

We need to do some arithmetic to find the dump with the object prefix that is to be deleted

Sample REXX provided to calculate an expiration date and set other symbols required in the DUMP JCL



```
/* REXX */
/*****
/* https://www.rexxla.org/rexxlang/mfc/datec.html
/*
/* Also, credit to expat from
/* http://ibmmainframes.com/about66336.html
*****/

numVersions = 7
cloud = TS7700CLOUD
contner = DSSDUMPS
prdvcl = VOL001
flctgt = FLC001

/* get today's date in 'Base' date format, e.g. '729584' */
today = Date('Base')

/* calculate date that we want to expire; returns '729577' */
expire = today - numVersions

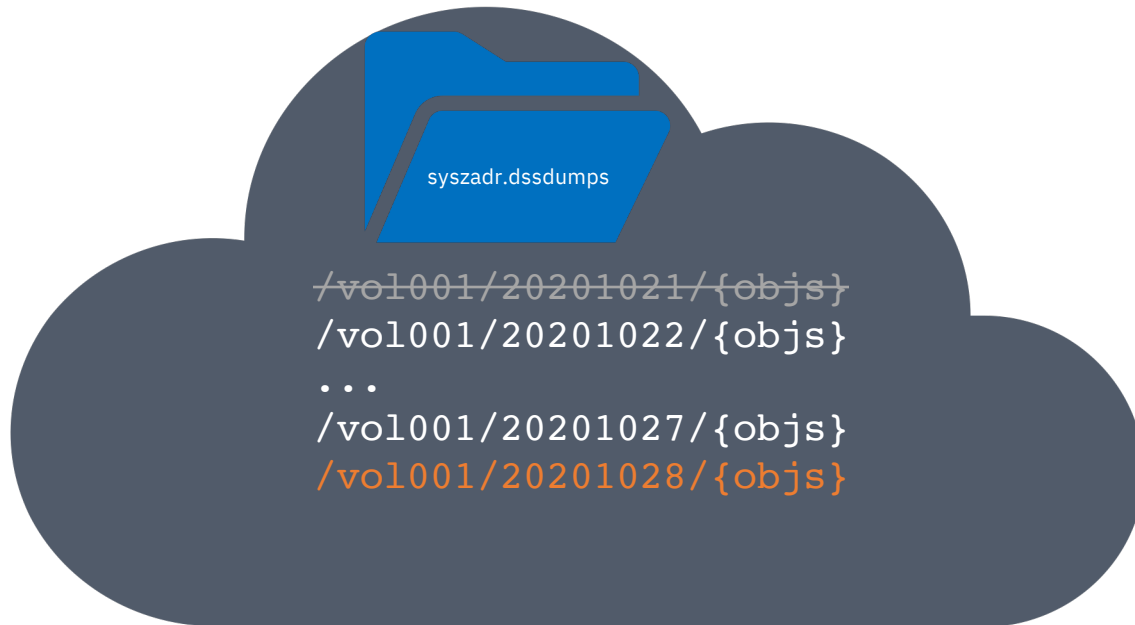
stoday = Date('Standard', today, 'Base')
sexpire= Date('Standard', expire, 'Base')

"free  fi(ispfile)"
"del  '"uid".ispfile'"
"alloc fi(ispfile) da('"uid".ispfile') new tracks space(5 5)
       recfm(f b) lrecl(80)"

/* EDIT The tailored file and submit manually */
address ispxexec "ftopen"
address ispxexec "ftincl nightly"
address ispxexec "ftclose"
address ispxexec "edit dataset('"uid".ispfile')"

EXIT
```

Real World Use Case



```
//DNIGHTLY JOB...
//DUMP EXEC PGM=ADRDSSU
//PRODVOL DD UNIT=SYSDA,DISP=SHR,VOL=SER=VOL001
//FLCVOL DD UNIT=SYSDA,DISP=SHR,VOL=SER=FLC001
//SYSPRINT DD SYSOUT=A
//SYSIN DD *
COPY FULL INDDNAME(PRD001) OUTDDNAME(FLCVOL) -
ALLDATA(*) ALLEXCP -
FCNOCOPY FCTOPPRCP(PresMirReq) DUMPCONDITIONING

IF LASTCC = 0 THEN
DUMP FULL INDDNAME(FLCVOL) FCWITHDRAW -
ALLDATA ALLEXCP(*) -
CDACREDS CLOUD( TS7700CLOUD ) CONTAINER( DSSDUMPS ) -
OBJECTPREFIX( 'DNIGHTLY/VOL001/D20201028' )

IF LASTCC = 0 THEN
CLOUDUTILS DELETE -
CDACREDS CLOUD( TS7700CLOUD ) CONTAINER( DSSDUMPS ) -
OBJECTPREFIX( 'DNIGHTLY/VOL001/D20201021' )

/*
```

Restoring a full volume dump

- ***Given a volume to be restored, use the `CLOUDUTILS LIST` Command to display the list of backups for that volume***

```
- CLOUDUTILS LIST CDACREDS CLOUD(TS7700CLOUD) CONTAINER(DSSDUMPS) OBJECTPREFIX('DNIGHTLY/VOL001')
0ADR605I (001)-CUTIL(02), 2020.279 13:33:21 THE FOLLOWING DUMP DATA SETS WERE FOUND
+
+          DNIGHTLY/VOL001/D20201022
+          DNIGHTLY/VOL001/D20201023
+          DNIGHTLY/VOL001/D20201024
+          DNIGHTLY/VOL001/D20201025
+          DNIGHTLY/VOL001/D20201026
+          DNIGHTLY/VOL001/D20201027
+          DNIGHTLY/VOL001/D20201028
```

- ***Update the `RESTORE JCL` to specify the cloud name, container name and the object prefix to be restored***

```
//RESTORE EXEC PGM=ADRDSSU
//DISK1 DD UNIT=SYSDA,DISP=SHR,VOL=SER=VOL001
//SYSPRINT DD SYSOUT=A
//SYSIN DD *
RESTORE -
FULL COPYVOLID -
OUTDDNAME ( DISK1 ) -
CLOUD( TS7700CLOUD ) -
CDACREDS -
CONTAINER( DSSDUMPS ) -
OBJECTPREFIX( 'DNIGHTLY/VOL001/D20201028' )
```


DFSMSdss DUMP/RESTORE FULL Requirements

Native Full Volume Dump and Restore is supported on z/OS V2R3 and z/OS V2R4 with PTFs for APAR OA57526

- *Includes support for CDACREDs and CLOUDUTILS LIST and DELETE capabilities*

Support using the DS8000 Object Store Feature of the TS7700 as well as traditional object stores

- *TS7700 as an object store is supported on VEC/VED model with 8.50.x code or above and requires FC5282 – DS8000 Object Store*

Supported on both DS8880 and DS8900F with microcode upgrades

- *DS8880 Release 8.5 SP6*
- *DS8900F Release 9.1*

Publications

IBM TS7700 Series DS8000 Object Store User's Guide Version 1.0, REDP-5583
<http://www.redbooks.ibm.com/abstracts/redp5583.html>

IBM DS8000 and Transparent Cloud Tiering, SG24-8381
<http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg248381.html>

Other Links to publications:

www.redbooks.ibm.com › Cloud

https://www.ibm.com/support/knowledgecenter/ST5GLJ_8.5.0/com.ibm.storage.ssic.help.doc/f2c_configuring_trans_cloud_tiering.html

<http://publibz.boulder.ibm.com/zoslib/pdf/OA51622.pdf>

https://www.ibm.com/support/knowledgecenter/en/SSLTBW_2.3.0/com.ibm.zos.v2r3.idak100/cloud23.htm

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1 2 3 4 5 6 7 8 9

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1 2 3 4 5 6 7 8 9

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1 2 3 4 5 6 7 8 9

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- The GSE UK Region team hope that you find this presentation and others that follow useful and help to expand your knowledge of z Systems.
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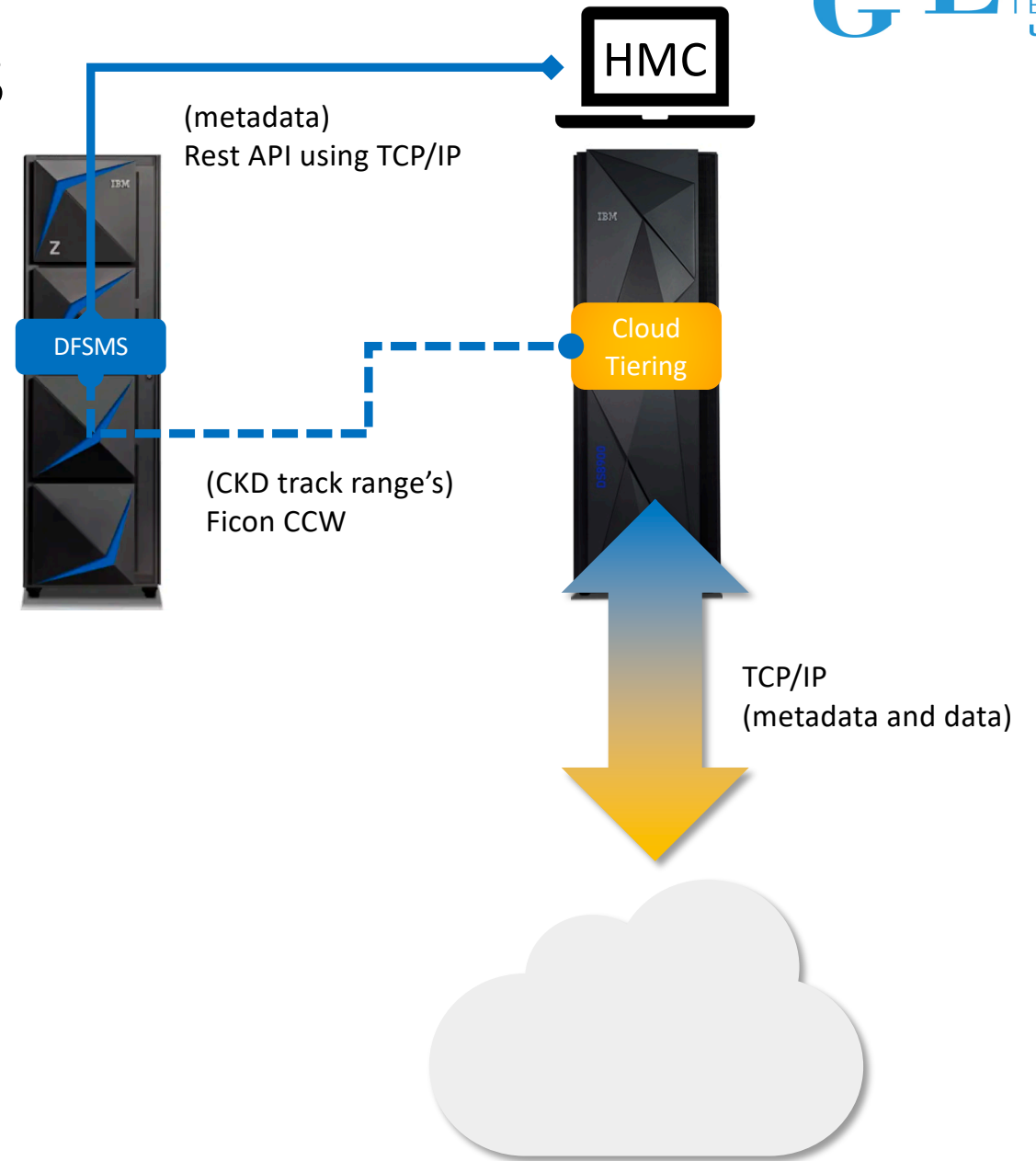
<http://uk.virginmoneygiving.com/GuideShareEuropeUKRegion>



Reference

Securing account credentials

- CDA Setup
- Copy CDA Configuration Samples
- Configure CSFKEYS and CSFSERV resource classes
- Add Cloud Provider Keys



Copy CDA Configuration Samples

Assumptions

The user that the DFSMSdss batch jobs are running under already has an OMVS segment defined.

TODO

Create a gdk sub-directory under the user's home directory

```
mkdir ~/gdk
```

Change directory into the gdk subdirectory

```
cd ~/gdk
```

Copy the gdk samples provided by IBM into the gdk subdirectory

```
cp -R /usr/lpp/dfsms/gdk/samples/* .
```

Create a file that corresponds to the cloudname defined in the DS8000, using mkcloudserver, and DFSMS network connection name

```
touch TS7700CLOUD.json
```

Listing stgadmins home directory

```
bash-4.3$ pwd
/u/stgadmin/gdk
```

```
bash-4.3$ ls -lr
total 48
drwxr-xr-x    2 stgadmin    stgadmin    8192 Oct  1 06:28 providers
-rw-r--r--    1 stgadmin    stgadmin    1911 Oct  5 13:22 gdkkeyf.json
-rw-r--r--    1 stgadmin    stgadmin     84 Sep 16 08:01 gdkconfig.json
```

```
bash-4.3$ ls -lr providers/
total 32
-rw-r--r--    1 stgadmin    stgadmin      0 Oct  1 06:28 TS7700CLOUD.json
-rw-r--r--    1 stgadmin    stgadmin   1480 Sep 16 08:01 S3CLOUD.json
-rw-r--r--    1 stgadmin.    stgadmin   1411 Sep 16 08:01 IBMCOS.json
```


Configure CSFKEYS General Resource Class

Assumptions

The CSFKEYS general resource class is active and RACLISTed.

The CSFSERV general resource class is active and RACLISTed.

TODO

```
PERMIT CSFKGN* CLASS(CSFSERV) ID(STGADMIN) ACCESS(READ)
```

```
PERMIT CSFKRC* CLASS(CSFSERV) ID(STGADMIN) ACCESS(READ)
```

```
RDEFINE CSFKEYS GDK.STGADMIN.* UACC(NONE)
```

```
PERMIT GDK.STGADMIN.* CLASS(CSFKEYS) ID(stgadmin) ACCESS(READ)
```

```
RALTER CSFKEYS GDK.STGADMIN.* ICSF(SYMCPACFWRAP(YES))
```

The ICSF segment of the CSFKEYS class profiles covering the keys created by CDA must contain SYMCPACFWRAP(YES).

z/OS Cloud Data Access Authorization Utility

ISPF Primary Option Menu

20.275

Option ==> `tso exec 'sys1.saxrexec(gdkauthp)'`

0	Settings	Terminal and user parameters	<	Calendar				>
1	View	Display source data or listings		October 2020				
2	Edit	Create or change source data	Su	Mo	Tu	We	Th	Fr Sa
3	Utilities	Perform utility functions					1	2 3
4	Foreground	Interactive language processing	4	5	6	7	8	9 10
5	Batch	Submit job for language processing	11	12	13	14	15	16 17
6	Command	Enter TSO or Workstation commands	18	19	20	21	22	23 24
7	Dialog Test	Perform dialog testing	25	26	27	28	29	30 31
9	IBM Products	IBM program development products						
10	SCLM	SW Configuration Library Manager	Time :				06:25	
11	Workplace	ISPF Object/Action Workplace	Day of year. :				275	
12	z/OS System	z/OS system programmer applications						
13	z/OS User	z/OS user applications						
L	SSD-SP	SSD SP Local Selection Panel						

Enter X to Terminate using log/list defaults

Configuring CDA

```
z/OS Cloud Data Access Authorization Utility
Option  ===>
```

```
  L Display Resource Authorization List
  O Open Credential Entry Panel
```

Select Cloud Provider

```
 3 1.IBMCOS
   2.S3CLOUD
   3.TS7700CLOUD
```

Encryption Parameters

```
Provider . . .
UserID . . . . stgadmin
Resource . . . /
```

Choose Cloud Provider, User ID, and optional Resource. Enter "O" on the Option to enter the Key and Secret Key.

Underneath the Select Cloud Provider, enter option 3 for the TS7700CLOUD and hit enter.

This will fill in the Provider field underneath the Encryption Parameters section

Select the cloud provider

Make sure the UserID is also set

Open Credentials Entry Panel

```
z/OS Cloud Data Access Authorization Utility
Option ==> 0
  L Display Resource Authorization List
  O Open Credential Entry Panel
```

Select Cloud Provider

- 1.IBM COS
- 2.S3CLOUD
- 3.TS7700CLOUD

Encryption Parameters

```
Provider . . . TS7700CLOUD
UserID . . . . stgadmin
Resource . . . /
```

Choose Cloud Provider, User ID, and optional Resource. Enter "O" on the Option to enter the Key and Secret Key.

Confirm that the Provider and UserID parameters under the Encryption Parameters are correct.

Note: DFSMSdss does not use the Resource option, so leave that as a forward slash

On the Option Line select 'O' to open the credentials entry panel and hit enter.

Store credentials

z/OS Cloud Data Access Authorization Utility

Option ==> S

Key saved/updated...

S Save Resource Authorization

C Clear Secret Key Field
(for hidden input)

Encryption Parameters

Provider . . . TS7700CLOUD

KeyLabel . . . GDK.STGADMIN.TS7700CLOUD

Keystore . . . /u/stgadmin/gdk/gdkkeyf.json

Resource . . . /

Authorization Parameters

Key *userid*

Secret Key . . *****

Enter the username and password, type S on the Option line and hit enter.

CDA will encrypt the username and password with a key label it created and stored in ICSF.

Enter the Key and Secret Key used to access the specified Cloud Provider.