Data Domain Technical Workshop

How to measure Data Domain capacity?

The most fresh version of this document, you will find at:
https://inside.emc.com/docs/DOC-187329

Wszystkie materiały o Data Domain po polsku:
http://backuprecoveryman.blogspot.com/2016/02/przeglad-materiaow-po-polsku.html#DataDomain

Data Domain Virtual Edition:
http://backuprecoveryman.blogspot.com/2016/02/przeglad-materiaow-po-polsku.html#DataDomainVirtualEdition

Daniel.Olkowski@emc.com
Technology Consultant
Data Protection Systems
Enabling physical capacity measurement
Enable physical capacity measurement
Log-in into Data Domain
Enable physical capacity measurement

Command line:
```
compression physical-capacity-measurement enable
```
Enable physical capacity measurement

Enable physical capacity measurement

By default, measuring physical capacity is turned off.

You must turn it on.

Command line:
compression physical-capacity-measurement enable
Enable physical capacity measurement
Ad hoc Data Domain physical capacity measurement
In my case names of logical Data Domains (mtrees) are very technical (avamar, cifs1)

Usually you name mtrees
  • Marketing, Washington, London, ... (name of departments if you use DD as single customer)
  • Customer1, Customer2, Customer3 (name of your customers if you are Service Provider)

However you name the mtrees (logical Data Domains), you can measure how much physical capacity each mtree occupies.
We measure how much data (after de-duplication), DD keeps, to restore data for this mtree.

Enable physical capacity measurement.

We measure how much data (after de-duplication), DD keeps, to restore data for this mtree.
Data Domain measure physical capacity for specified mtree on request.

You need to schedule measuring physical capacity or like here – you can measure physical capacity for any mtree on demands.
Physical capacity measurement

Measure physical data ad hoc

The job will be in the last position in the queue

The job will be in the first position in the queue
Physical capacity measurement
Observing that capacity measurement job is running
Physical capacity measurement
Observing that capacity measurement job is running
Physical capacity measurement
Observing that capacity measurement job is running

You need to wait some time
to allow measuring physical job
to finish
Physical capacity measurement
Measure physical data ad hoc
After some time...
You can see how much data DD keeps to restore all information from specific mtree
If you divide the pre-compression data (data that DD can restore) by the used (post-compression) data (data that DD keeps), you get the compression rate for this particular mtree.
Define schedule for Data Domain physical capacity measurement
Physical capacity measurement
Defying schedule to measure mtree occupancy
Physical capacity measurement
Defying schedule to measure mtree occupancy
Physical capacity measurement
Defying schedule to measure mtree occupancy

From GUI, you can measure only physical capacity of the whole mtree.

You can measure physical capacity for any
- mtree
- directory
- File

from command line
See later slides
Physical capacity measurement
Defying schedule to measure mtree occupancy

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Priority</th>
<th>Schedule</th>
<th>MTree Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>mtreeAllPhysicalCapacity</td>
<td>Enabled</td>
<td>Normal</td>
<td>Every day at 2:00 PM</td>
<td>4</td>
</tr>
</tbody>
</table>
Enable physical capacity measurement
Physical capacity measurement
Defying schedule to measure mtree occupancy

You can assign multiple physical capacity measurement schedules to this MTree.

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Priority</th>
<th>Schedule</th>
<th>MTree Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTree:AllPhysicalCapacity</td>
<td>Enabled</td>
<td>Normal</td>
<td>Every day at 2:00 PM</td>
<td>4</td>
</tr>
</tbody>
</table>
Reporting physical capacity from **DDMCS**

*(Data Domain Management Center)*
Reporting physical capacity from DDMC

Login into DDMCS

http://ddmc14.labd.local
Reporting physical capacity from DDMC
Utilization information
Reporting physical capacity from DDMC
Utilization information

You have physical capacity measurement from all mtrees and from Data Domains registered in DDMCS.

Data Domain dd57b does not have turned on physical capacity measurement on any mtree.
Reporting physical capacity from DDMC
Filtering by Data Domain system
### Reporting physical capacity from DDMC

**Filtering by Data Domain system**

<table>
<thead>
<tr>
<th>Type</th>
<th>MTree</th>
<th>System</th>
<th>Logical Capacity (Current Pre-Comp)</th>
<th>Physical Capacity (Last Measured Post-Comp)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Used</td>
<td>Quote</td>
</tr>
<tr>
<td>data</td>
<td>datacol1/avnar-145035...</td>
<td>dd57a.abd.local</td>
<td>22.95 TIB</td>
<td>Disabled</td>
</tr>
<tr>
<td>data</td>
<td>datacol1/avnar-145131...</td>
<td>dd57a.abd.local</td>
<td>2.80 TIB</td>
<td>Disabled</td>
</tr>
<tr>
<td>data</td>
<td>datacol1/backup</td>
<td>dd57a.abd.local</td>
<td>0.00 Bytes</td>
<td>Disabled</td>
</tr>
<tr>
<td>data</td>
<td>datacol1/oct1</td>
<td>dd57a.abd.local</td>
<td>4.89 GIB</td>
<td>Disabled</td>
</tr>
</tbody>
</table>
Reporting physical capacity from DDMC
Filtering by Data Domain system

Management Center (DDMC) shows physical capacity occupancy for each mtree in nice tabular form.
### Reporting physical capacity from DDMC

Choose columns to show

<table>
<thead>
<tr>
<th>Type</th>
<th>MTree</th>
<th>System</th>
<th>Logical Capacity (Current Pre-Comp)</th>
<th>Physical Capacity (Last Measured Post-Comp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datacollection</td>
<td>dd57a.labd.local</td>
<td>1450355275</td>
<td>23.56 TiB, Disabled, N/A, N/A, N/A</td>
<td>In progress</td>
</tr>
<tr>
<td>Datacollection</td>
<td>dd57a.labd.local</td>
<td>145130290</td>
<td>2.00 TiB, Disabled, N/A, N/A, N/A</td>
<td>Completed, 31.27 GiB</td>
</tr>
<tr>
<td>Datacollection</td>
<td>dd57a.labd.local</td>
<td>backup</td>
<td>0.00 Bytes, Disabled, N/A, N/A, N/A</td>
<td>Completed, 0.00 Bytes</td>
</tr>
<tr>
<td>Datacollection</td>
<td>dd57a.labd.local</td>
<td>data1</td>
<td>4.08 GiB, Disabled, N/A, N/A, N/A</td>
<td>Completed, 58.43 MiB</td>
</tr>
</tbody>
</table>

**dd57a.labd.local**

<table>
<thead>
<tr>
<th>/data/col1/avamar.1450355275</th>
</tr>
</thead>
</table>

### Space Usage

#### Current

- Pre-comp used: 23.56 TiB
### Reporting physical capacity from DDMC

#### Sorting information / filtering

<table>
<thead>
<tr>
<th>Typ</th>
<th>MTree</th>
<th>System</th>
<th>Logical Capacity (Current Pre-Comp)</th>
<th>Physical Capacity (Last Measured Post-Comp)</th>
<th>Job State</th>
<th>Used</th>
<th>Compression</th>
<th>Snapshots</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>/data/coll1/avamar-1450355275</td>
<td>dd57a.labd.local</td>
<td>23.56 TiB</td>
<td>Disabled</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/data/coll1/avamar-1451310290</td>
<td>dd57a.labd.local</td>
<td>2.80 TiB</td>
<td>Disabled</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/data/coll1/backups</td>
<td>dd57a.labd.local</td>
<td>0.00 Bytes</td>
<td>Disabled</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/data/coll1/cifs1</td>
<td>dd57a.labd.local</td>
<td>4.80 GiB</td>
<td>Disabled</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>26.36</td>
<td>TiB</td>
<td>N/A</td>
<td>N/A</td>
<td>26.36</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reporting physical capacity from DDMC

What does it mean?

Data Domain keeps 22.95 TB source data (Pre-Comp) on the mtree.

It means that different sources sent to this mtree 22.95 TB data, that Data Domain can restore any time.

If you divide 22.95TB by 66,21GB you achieve de-duplication ratio for this particular mtree (1:326.6)

To restore this 22.95 TB data, Data Domain needs only 66,21GB.

So Data Domain de-duplicated 22.95 TB that it received. After de-duplication, this 22.95TB occupies only 66,21GB on Data Domain.
Comparing physical capacity occupation
DD stored data vs mtree stored data

<table>
<thead>
<tr>
<th>MTree</th>
<th>System</th>
<th>Logical Capacity (Current Pre-Comp)</th>
<th>Physical Capacity (Last Measured Post-Comp)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Used</td>
<td>Quota</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23.56 TB</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.80 TB</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.00 Bytes</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.89 GB</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity Utilization (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtered by dd57a.labd.local</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MTree</th>
<th>System</th>
<th>Space Usage (Post-Comp)</th>
<th>Pre-Comp Used</th>
<th>Compression Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Used</td>
<td>Available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>404.12 GB</td>
<td>182.97 GB</td>
<td>221.16 GB</td>
</tr>
</tbody>
</table>

System Details: Launch DD System Manager, Export CSV File, Physical Capacity Measurement

**Note:** The table data and highlighted rows indicate the comparison of physical capacity utilization between DD stored data and mtree stored data on the specified systems.
Understanding physical capacity
Understanding physical capacity

Login into DDMCS

http://ddmc14.labd.local

FQDN or IP of your DDMC
Data Domain Management Center
Understanding physical capacity

DDMC – going into section with physical capacity

<table>
<thead>
<tr>
<th>Type</th>
<th>MiTree</th>
<th>System</th>
<th>Logical Capacity (Current Pre-Comp)</th>
<th>Physical Capacity (Last Measured Post-Comp)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ccl57a.labx.local</td>
<td>26.95 TB</td>
<td>N/A N/A N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ccl57a.labx.local</td>
<td>3.00 TB</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ccl57a.labx.local</td>
<td>0.00 Bytes</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ccl57a.labx.local</td>
<td>0.01 GB</td>
<td>Disabled</td>
</tr>
</tbody>
</table>
Understanding physical capacity
Data stored on whole DD vs mtree stored data
Understanding physical capacity
Data stored on whole DD vs mtree stored data

Summary of all mtree occupation (data kept by DD on each mtree) is 91.47 GB (66.21 + 31.27 + 0.05843).

This is less than all data sitting on Data Domain, which is 182,97GB.

How is it possible?
The issue is cleaning.
Here you see all data on Data Domain. So you can see here
• Backups, copies, archive, production data
• But also data who are no longer valid (for example deleted by
backup application), but take place on Data Domain and will be
 cleaned during next garbage collection.
So, production data is less than you can see here.

See next page that will prove,
Next slide shows garbage collection that will increase available data and
- by logical consequence - decrease used data.
Understanding physical capacity

Cleaning can save lots of space!!!

Cleaning process increased available space on Data Domain by 134GB
- From 222GB free space
- To 356GB free space

Data Domain during garbage collection removes almost all no longer valid data, but this is usually not removing 100% of expired data.
Understanding physical capacity
Data stored on whole DD vs mtree stored data

After garbage collection process
Understanding physical capacity
Starting ad hoc data measuring (after cleaning)

After cleaning has finished, we start physical capacity measurement to have exact data after de-duplication for each mtree.

The measurement job has been queued for execution.
Understanding physical capacity

Waiting for job measuring physical capacity to finish

Job that measures physical capacity is in progress
Understanding physical capacity
Data stored on whole DD vs mtrees stored data

After
• cleaning is finished
• performing another measuring capacity
you can compare
• sum of physical capacity of all mtrees
vs
• total Data Domain capacity utilization

Totally: 105.52 GiB
Sum of de-duplicated data per mtree is bigger than all data stored on Data Domain.

Data Domain has global de-duplication. Also between mtrees. Anyhow here, in physical capacity measurement, the same block, that is shared between mtrees, it is calculated several times. Physical capacity measurement is separate calculation for each mtree. So if the single block belongs to many mtrees, it calculated here many times (for every mtree that the block belongs to), even though this is single block on Data Domain system.

So, in the this sum, the single block that belongs to 3 mtrees is calculated 3 times (though it occupies space on Data Domain just once).

But here (for whole Data domain is calculated just once)

Here you have information about whole occupation of data at Data Domain, so each block is calculated just once. Thus, this value is smaller than this one.

Anyhow, this value includes both data than can be restored, and also data that has expired and not cleaned yet! So real data is even smaller!!!
Reporting physical capacity measurements from CLI
Physical capacity measurement
Showing all measurements

The below command shows for each mtree how the physical capacity has changed historically (shows all measurements)

```
compression physical-capacity-measurement sample show history
```

<table>
<thead>
<tr>
<th>Measurement Time</th>
<th>Logical Used (Pre-Comp) (GiB)</th>
<th>Logical Used (Post-Comp) (GiB)</th>
<th>Global-Comp Factor</th>
<th>Local-Comp Factor</th>
<th>Total-Comp Factor (Reduction %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015/12/30 14:00:02</td>
<td>12625.0</td>
<td>49.9</td>
<td>117.93x</td>
<td>2.62x</td>
<td>308.63x (99.68%)</td>
</tr>
<tr>
<td>2015/12/31 14:00:01</td>
<td>15625.0</td>
<td>49.3</td>
<td>121.14x</td>
<td>2.62x</td>
<td>317.14x (99.68%)</td>
</tr>
<tr>
<td>2016/01/01 14:00:02</td>
<td>18625.0</td>
<td>57.7</td>
<td>123.03x</td>
<td>2.62x</td>
<td>322.59x (99.69%)</td>
</tr>
<tr>
<td>2016/01/02 14:00:02</td>
<td>21625.0</td>
<td>66.2</td>
<td>124.82x</td>
<td>2.63x</td>
<td>326.60x (99.69%)</td>
</tr>
<tr>
<td>2016/01/03 09:52:01</td>
<td>24125.0</td>
<td>73.2</td>
<td>125.44x</td>
<td>2.63x</td>
<td>329.79x (99.70%)</td>
</tr>
<tr>
<td>2016/01/03 14:00:02</td>
<td>24125.0</td>
<td>73.2</td>
<td>125.44x</td>
<td>2.63x</td>
<td>329.79x (99.70%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement Time</th>
<th>Logical Used (Pre-Comp) (GiB)</th>
<th>Logical Used (Post-Comp) (GiB)</th>
<th>Global-Comp Factor</th>
<th>Local-Comp Factor</th>
<th>Total-Comp Factor (Reduction %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015/12/30 14:00:02</td>
<td>1640.0</td>
<td>28.1</td>
<td>43.51x</td>
<td>1.34x</td>
<td>58.30x (98.23%)</td>
</tr>
<tr>
<td>2015/12/31 14:00:02</td>
<td>2050.0</td>
<td>29.2</td>
<td>52.43x</td>
<td>1.34x</td>
<td>70.25x (98.58%)</td>
</tr>
<tr>
<td>2016/01/01 14:00:02</td>
<td>2460.0</td>
<td>30.2</td>
<td>60.74x</td>
<td>1.34x</td>
<td>81.39x (96.77%)</td>
</tr>
<tr>
<td>2016/01/02 14:00:02</td>
<td>2870.0</td>
<td>31.3</td>
<td>68.50x</td>
<td>1.34x</td>
<td>91.79x (98.91%)</td>
</tr>
<tr>
<td>2016/01/03 14:00:01</td>
<td>3280.0</td>
<td>32.3</td>
<td>75.74x</td>
<td>1.34x</td>
<td>101.50x (99.01%)</td>
</tr>
</tbody>
</table>
From command line you can see results of all historical „physical capacity measurements” for any mtree.

From GUI (Data Domain or Management Center) you see just last physical capacity measurements for each mtree.
Physical capacity measurement
Showing all measurements

The below command shows for mtree
/data/col1/cifs1
how the physical capacity has changed historically (shows all results of „physical capacity measurements”)

compression physical-capacity-measurement sample show history mtrees /data/col1/cifs1

<table>
<thead>
<tr>
<th>Measurement Time</th>
<th>Logical Used</th>
<th>Physical Used</th>
<th>Global-Comp Factor</th>
<th>Local-Comp Factor</th>
<th>Total-Comp Factor (Reduction %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Pre-Comp)</td>
<td>(Post-Comp)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015/12/30 06:54:04</td>
<td>2.1</td>
<td>0.0</td>
<td>52.32x</td>
<td>1.01x</td>
<td>52.64x (98.10%)</td>
</tr>
<tr>
<td>2015/12/30 14:00:02</td>
<td>2.1</td>
<td>0.0</td>
<td>52.32x</td>
<td>1.01x</td>
<td>52.64x (98.10%)</td>
</tr>
<tr>
<td>2015/12/30 21:49:17</td>
<td>2.1</td>
<td>0.0</td>
<td>52.32x</td>
<td>1.01x</td>
<td>52.64x (98.10%)</td>
</tr>
<tr>
<td>2015/12/31 14:00:02</td>
<td>4.9</td>
<td>0.1</td>
<td>35.13x</td>
<td>1.01x</td>
<td>85.64x (98.83%)</td>
</tr>
<tr>
<td>2016/01/01 14:00:02</td>
<td>4.9</td>
<td>0.1</td>
<td>35.13x</td>
<td>1.01x</td>
<td>85.64x (98.83%)</td>
</tr>
<tr>
<td>2016/01/02 14:00:02</td>
<td>4.9</td>
<td>0.1</td>
<td>35.13x</td>
<td>1.01x</td>
<td>85.64x (98.83%)</td>
</tr>
<tr>
<td>2016/01/03 14:00:02</td>
<td>4.9</td>
<td>0.1</td>
<td>35.13x</td>
<td>1.01x</td>
<td>85.64x (98.83%)</td>
</tr>
</tbody>
</table>

Total number of measurements retrieved - 7.

Physical capacity measurement
Showing all measurements detailed

The below command shows for each mtree all historical physical capacity measurements in detailed form:

```
compression physical-capacity-measurement sample show detailed-history
```

Here are additional columns comparing to non detailed version:

<table>
<thead>
<tr>
<th>Task ID</th>
<th>Task Start Time</th>
<th>Task End Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>6565955533</td>
<td>2015/12/30 14:02:38</td>
<td>2015/12/30 14:09:20</td>
</tr>
<tr>
<td>2147483648</td>
<td>2015/12/31 14:04:23</td>
<td>2015/12/31 14:06:20</td>
</tr>
<tr>
<td>25769000777</td>
<td>2016/01/01 14:01:49</td>
<td>2016/01/01 14:03:49</td>
</tr>
<tr>
<td>30064771073</td>
<td>2016/01/02 14:03:44</td>
<td>2016/01/02 14:05:57</td>
</tr>
<tr>
<td>34359748699</td>
<td>2016/01/03 09:55:19</td>
<td>2016/01/03 09:57:20</td>
</tr>
<tr>
<td>5868705685</td>
<td>2016/01/03 14:05:16</td>
<td>2016/01/03 14:06:13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task ID</th>
<th>Task Start Time</th>
<th>Task End Time</th>
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</thead>
<tbody>
<tr>
<td>6565955533</td>
<td>2015/12/30 14:02:38</td>
<td>2015/12/30 14:09:20</td>
</tr>
<tr>
<td>2147483648</td>
<td>2015/12/31 14:04:23</td>
<td>2015/12/31 14:06:20</td>
</tr>
<tr>
<td>25769000777</td>
<td>2016/01/01 14:01:49</td>
<td>2016/01/01 14:03:49</td>
</tr>
<tr>
<td>30064771073</td>
<td>2016/01/02 14:03:44</td>
<td>2016/01/02 14:05:57</td>
</tr>
<tr>
<td>34359748699</td>
<td>2016/01/03 09:55:19</td>
<td>2016/01/03 09:57:20</td>
</tr>
<tr>
<td>5868705685</td>
<td>2016/01/03 14:05:16</td>
<td>2016/01/03 14:06:13</td>
</tr>
</tbody>
</table>

The table above shows the historical physical capacity measurements for each mtree in detailed form. The measurements include compression achieved, logical and physical used space, and detailed factor calculations for each measurement point.
Physical capacity measurement
Showing all measurements detailed

The below command shows for each mtree all historical physical capacity measurements in detailed form for just one mtree:

```
/data/col1/cifs1
```

compression physical-capacity-measurement sample show detailed-history mtrees /data/col1/cifs1

Here are additional columns comparing to non detailed version

col1

<table>
<thead>
<tr>
<th>MTree: /data/col1/cifs1</th>
<th>Logical Used (Pre-Comp)</th>
<th>Physical Used (Post-Comp)</th>
<th>Global-Comp Factor</th>
<th>Local-Comp Factor</th>
<th>Total-Comp Factor (Reduction %)</th>
<th>Task ID</th>
<th>Task Start Time</th>
<th>Task End Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015/12/30 06:54:04</td>
<td>2.1</td>
<td>0.0</td>
<td>52.32x</td>
<td>1.01x</td>
<td>52.64x (98.10%)</td>
<td>429967297</td>
<td>2015/12/30 06:57:06</td>
<td>2015/12/30 06:57:37</td>
</tr>
<tr>
<td>2015/12/30 11:49:17</td>
<td>2.1</td>
<td>0.0</td>
<td>52.32x</td>
<td>1.01x</td>
<td>52.64x (98.10%)</td>
<td>12664902069</td>
<td>2015/12/30 11:49:21</td>
<td>2015/12/30 11:49:22</td>
</tr>
<tr>
<td>2015/12/31 19:00:32</td>
<td>4.9</td>
<td>0.1</td>
<td>85.13x</td>
<td>1.01x</td>
<td>85.46x (98.63%)</td>
<td>21471403618</td>
<td>2015/12/31 19:00:25</td>
<td>2015/12/31 19:00:36</td>
</tr>
<tr>
<td>2016/01/01 14:00:02</td>
<td>4.9</td>
<td>0.1</td>
<td>85.13x</td>
<td>1.01x</td>
<td>85.46x (98.63%)</td>
<td>29769603780</td>
<td>2016/01/01 14:01:35</td>
<td>2016/01/01 14:01:42</td>
</tr>
<tr>
<td>2016/01/03 14:00:02</td>
<td>4.9</td>
<td>0.1</td>
<td>85.13x</td>
<td>1.01x</td>
<td>85.46x (98.63%)</td>
<td>30064771076</td>
<td>2016/01/03 14:00:44</td>
<td>2016/01/03 14:01:56</td>
</tr>
<tr>
<td>2016/01/03 14:00:02</td>
<td>4.9</td>
<td>0.1</td>
<td>85.13x</td>
<td>1.01x</td>
<td>85.46x (98.63%)</td>
<td>38667405668</td>
<td>2016/01/03 14:05:06</td>
<td>2016/01/03 14:06:13</td>
</tr>
</tbody>
</table>

Total number of measurements retrieved = 7.

```
illion@6657a:~$ compression physical-capacity-measurement sample show detailed-history mtrees /data/col1/cifs1
```
Measuring physical capacity for directories / files from CLI
Physical capacity measurement
Defining path for which we want to measure physical capacity

We create measurement definition (path) called ps1 that measures physical capacity in directory
/data/col1/cifs1/backup5/files
(part of mtree /data/col1/cifs1/)

compression physical-capacity-measurement pathset create ps1 paths /data/col1/cifs1/backup5/files

sysadmin@dd57:~ # compression physical-capacity-measurement pathset create ps1 paths /data/col1/cifs1/backup5/files
Pathset "ps1" created.
sysadmin@dd57:a#
Physical capacity measurement

Command line allows you to measure physical capacity for any directory or even file on Data Domain.

You can not achieve it from GUI (Data Domain or Management Center).

From GUI you see measure only physical capacity of the whole mtree.
Physical capacity measurement
Checking path for which we want to measure physical capacity

Checking that our measurement pathset was setup correctly

```
compression physical-capacity-measurement pathset show list

sysadmin@dd57a# compression physical-capacity-measurement pathset show list
Pathset  Number of paths  Measurement-retention (days)
--------  ****************  ****************
 psi      1                  180
--------  ****************  ****************
1 pathset(s) found.
```

```
compression physical-capacity-measurement pathset show detailed all

sysadmin@dd57a#
sysadmin@dd57a# compression physical-capacity-measurement pathset show detailed all
Pathset: psi
  Number of paths: 1
  Measurement-retention: 180 day(s)
  Paths:
  /data/coll/cifs1/backup5/files
sysadmin@dd57a#
```
Physical capacity measurement
Starting physical capacity measurement for our pathset

We start our measurement for directory:
/data/col1/cifs1/backup5/files
which is pathset ps1

compression physical-capacity-measurement sample start pathset ps1

Measurement task(s) submitted and will begin as soon as resources are available.

Physical capacity measurement
Checking status of our physical capacity measurement

We need to wait until measurement is finished or which means that our measurement task is no longer on the current tasks.

```
sysadmin@dd57a# compression physical-capacity-measurement sample show current all
Task ID  Type  Name     User  State    Creation Time Measurement Time Start Time Priority Percent Done
----------  ----  -------  -----  -------  ----------------- -----------------        -------  ------  ------
      51539607553  PS  psi  sysadmin  Scheduled  2016/01/04 00:30:09  2016/01/04 10:30:09   --     Normal  C
sysadmin@dd57a#
```

```
sysadmin@dd57a# compression physical-capacity-measurement sample show current all
No measurement tasks found.
sysadmin@dd57a#
```
Physical capacity measurement
Checking status of our physical capacity measurement

Now you can see how much data Data Domain is keeps to restore all data in directory:
/data/col1/cifs1/backup5/files
You can see all historical measurements of physical occupancy of above directory

Compression physical-capacity-measurement sample show history pathset ps1

sysadmin@dd57a# compression physical-capacity-measurement sample show history pathset ps1

<table>
<thead>
<tr>
<th>Pathset: ps1</th>
<th>Logical Used (Pre-Comp) (GiB)</th>
<th>Physical Used (Post-Comp) (GiB)</th>
<th>Global-Comp Factor</th>
<th>Local-Comp Factor</th>
<th>Total-Comp Factor (Reduction %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016/01/04 13:42:56</td>
<td>1.5</td>
<td>0.3</td>
<td>70.33x</td>
<td>1.01x</td>
<td>70.75x (98.59%)</td>
</tr>
<tr>
<td>2016/01/04 13:54:46</td>
<td>1.7</td>
<td>0.2</td>
<td>8.59x</td>
<td>1.05x</td>
<td>9.13x (99.05%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total number of measurements retrieved = 2.

sysadmin@dd57a#
### Physical capacity measurement
Checking status of our physical capacity measurement

1.7 GB data that we can use in directory 
/data/col1/cifs1/backup5/files
occupies after de-duplication just only 0.2 GB on Data Domain.

This give de-duplication factor: 1:9.13

<table>
<thead>
<tr>
<th>Pathset: ps1</th>
<th>Logical Used (Pre-Comp) (GiB)</th>
<th>Physical Used (Post-Comp) (GiB)</th>
<th>Global-Comp Factor</th>
<th>Local-Comp Factor</th>
<th>Total-Comp Factor (Reduction %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016/01/04 13:42:56</td>
<td>1.5</td>
<td>0.0</td>
<td>70.33x</td>
<td>1.01x</td>
<td>70.75x (98.59%)</td>
</tr>
<tr>
<td>2016/01/04 13:54:46</td>
<td>1.7</td>
<td>0.2</td>
<td>5.59x</td>
<td>1.05x</td>
<td>9.13x (89.05%)</td>
</tr>
</tbody>
</table>

Total number of measurements retrieved = 2.
Questions...

Daniel.Olkowski@emc.com