



New Features in ibaHD v2.1.0

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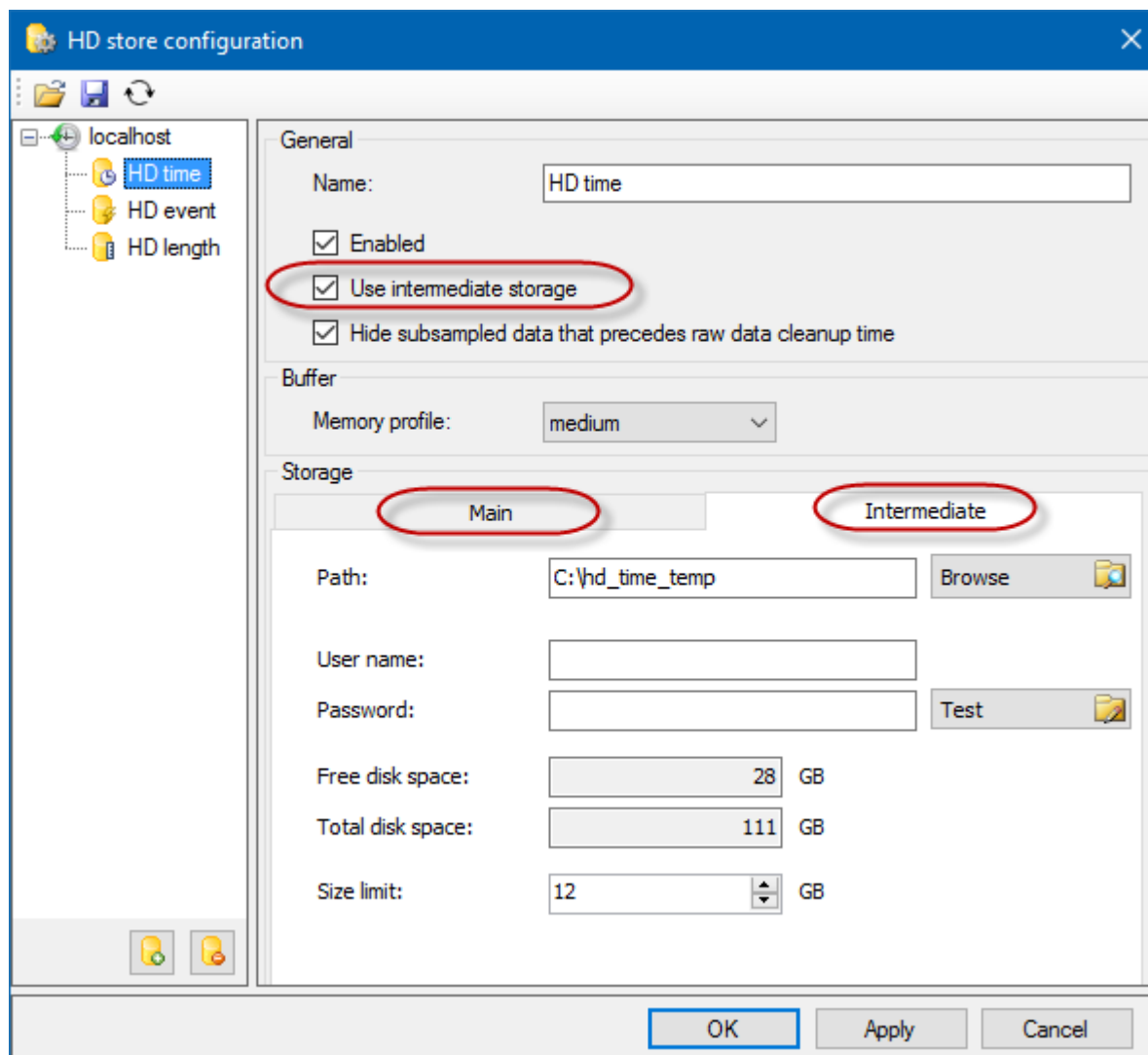
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1 Intermediate storage

The HD store configuration has been expanded with an option to use intermediate storage. When enabled, next to the main storage directory, a second directory can be specified.



The main storage directory is meant to be located on a HDD partition. The intermediate storage directory is meant to be located on a SSD partition.

When this option is enabled, the SSD is used to temporarily store the newly added data so that it can be reorganized for optimal read performance before the data is moved to main storage on the hard disk drive.

Using this option drastically decreases response time when large amounts of data are requested by the clients, while the acquisition to the store is active or data is imported into the store.



Intermediate storage size limits

The intermediate storage size cannot be larger than the main storage size.

For time and length based stores, the intermediate storage size has to be larger than or equal to “*Min(10% of main storage size, 20 GB)*”



Intermediate storage as buffer

Next to the in-memory buffer, the intermediate storage will act as a second buffer in case the hard disk drive is too busy to process all I/O operations. In case the intermediate storage overflows, the active acquisition to the HD server will disconnect and the store will refuse new write-connections until half of the intermediate storage has been flushed to main storage. These write-clients will receive an error stating an intermediate storage overflow.

ibaPDA v6.38 (or the HD manager application) is required to configure intermediate storage.

1.1 Recommendations

- main storage
 - create one partition for each HD store
 - preferably on a private (RAID) HDD
 - don't use the partition as DAT-file storage or 3rd party storage
- intermediate storage
 - use an SSD with good mixed random read/write performance
 - leave 20% of the SSD unpartitioned
 - the same SSD partition can be used as intermediate storage for multiple HD stores, depending on the throughput to the HD stores
 - if the intermediate storage overflows then the write client(s) will disconnect stating an 'intermediate storage overflow' and they won't be able to reconnect until enough data has been flushed to main storage
 - NVMe interface is beneficial

1.2 Benchmark

Keeping the recommendations in the previous section in mind, a time based HD store of 2 TB is configured to receive online acquisition data for 3000 analog and 3000 digital signals sampled at 1 KHz, generating a constant write IO stream of ~10 MB/s or ~6 million samples per second to the store.

When 6 TB of data has been written - and cleanup has thus removed 4 TB - data is requested using a client side script, while the data acquisition is still running.

- data is requested for a subset of 40 signals, spread evenly over the configuration
- for each of the raw and subsampling levels, four data ranges are requested, spread evenly over the available data range
- For each request 10 MB of consecutive data is read

The total execution time is logged, together with the average number of received samples per second and the average data throughput.

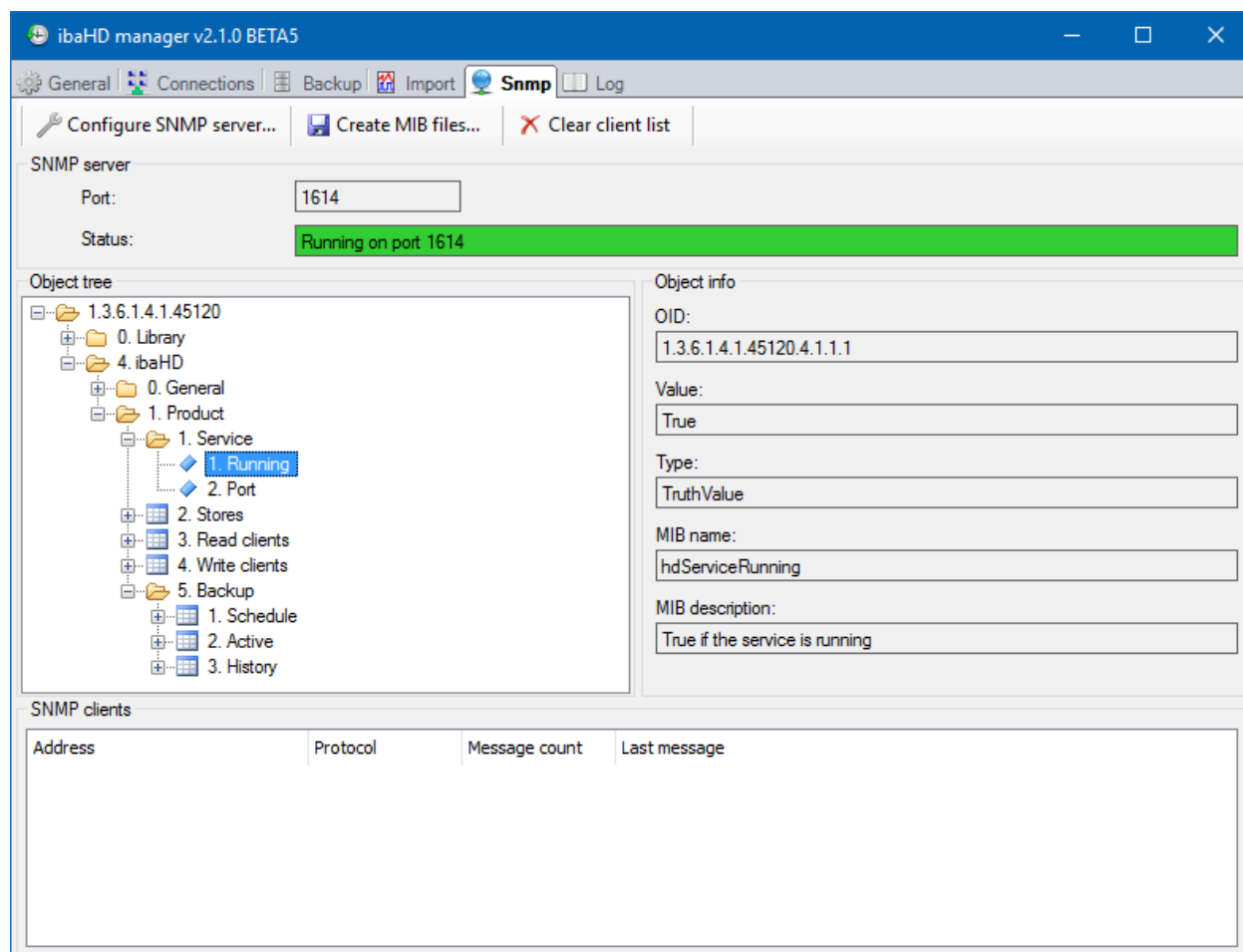
intermediate storage	execution time	average samples/s	average throughput
disabled	13h 43m 22s	252520,87	107,65 KB/s
enabled	00h 05m 03s	58267408,33	18177,98 KB/s

By enabling intermediate storage the read performance is drastically improved, even though more than 95% of the requested data is read from main storage (HDD).

An average read throughput of ~58 million samples per second is reached while the online acquisition is writing ~6 million samples per second.

2 SNMP server

SNMP server functionality is added for server monitoring purposes. Using the ibaHD manager application the SNMP server can be enabled or disabled. Its UDP listener port can be configured and a MIB file, required in SNMP client applications, can be generated. The SNMP object tree and a list of connected clients is displayed.



It is possible to monitor information about

- license
- service
- stores
- read clients
- write clients
- backups

3 Reduced live data stream size

The size of the live signal data stream that is sent to connected clients has been reduced. The table below shows results from a small test with a single client. The data rate was measured and averaged over a 5 minute interval.

subsampling level	no. signals	v2.0 (KB/s)	v2.1 (KB/s)
raw	1A	17.23	5.34
raw	10A	162	48.4
raw	30A+20D	841	132
1st	1A	17.75	0.705
1st	10A	170	6.95
1st	30A+20D	556	28.3
2nd	1A	1.6	0.075
2nd	10A	17.5	0.775
2nd	30A+20D	25.7	3.8

ibaPDA client v6.38.0 or newer is required for this measure to take effect.