



DataOptimizer 4

Manual

SUPPORT INFORMATION

Phone (US and CAN) +1.877.399.9002
Phone (international) +1.775.823.9002
Helpdesk page support.4bright.com
E-Mail support@4bright.com

CONTENTS

ABOUT THIS DOCUMENT.....	3
Purpose	3
Notice	3
BTI Software Warranty.....	3
DATAOPTIMIZER OVERVIEW	4
DATAOPTIMIZER COMMAND USAGE AND OPTION DESCRIPTIONS.....	4
DATAOPTIMIZER COMMAND EXAMPLES.....	7
File Layout Analysis.....	7
File Layout Optimization.....	9
BRIGHT SOFTWARE FILE SEQUENCE AWARENESS	10
3D STEREOSCOPIIC OPTIMIZER.....	11
3D Layout Analysis.....	11
3D Layout Optimization	12
APPENDIX A: TERMS AND ACRONYMS.....	13

ABOUT THIS DOCUMENT

Purpose

This document provides an overview of the Bright DataOptimizer program along with usage examples of file performance analysis and file performance optimization.

This document is intended for use by computer system professionals who support media studios in managing production workflow data.

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DATAOPTIMIZER OVERVIEW

Bright DataOptimizer (BDO) is an optimization tool for shared media environments. It is designed to detect and improve playback performance issues for media clips that are physically fragmented, interleaved, or randomized on your shared file system. BDO works with StorNext® and HyperFS™ volumes, and includes support for allocation sessions as well.

Typically, storage volumes provided by a storage area network (SAN) file system are considered as workspaces. A workspace refers to shared storage space accessed through a high-speed SAN, where a name-space or volume provided by the SAN is mounted on client workstations. As files are added and moved around on the workspace over time, the files become fragmented and/or randomly arranged by the file system. This results in significantly reduced read performance with the workspace.

Use BDO to reclaim read performance with the workspace storage. Start by running a BDO analysis on a specified target on the workspace. The target can be a single file or a directory (in which all files in the directory will be analyzed). The analysis will include a recommendation to run the BDO optimize operation if file read performance can be improved. The BDO optimize operation will re-arrange the specified target on the storage in a manner that provides the best possible read performance.

BDO features include file sequence awareness, providing powerful optimization of large media clips or file sets, and multi-threaded operations for taking full advantage of available hardware resources. Use BDO to quickly restore optimal file arrangement on shared media workspaces.




DATAOPTIMIZER COMMAND USAGE AND OPTION DESCRIPTIONS

USAGE: bdo [-<flag> [<val>] | --<name>[={| }<val>]]... [files...]

<i>Flg</i>	<i>Arg</i>	<i>Option-Name</i>	<i>Description</i>
-L	Str	--license	Path to license file.
-r		--recurse	Recursively optimize directories (include all sub-directories). Disabled as --dont-recurse (default).
		--optimize	Perform optimization. When not specified, only analysis of the target directory contents is performed (there is no modification of data arrangement). Disabled as --dont-optimize (default).

Analysis parameters:

	--freeSpace	Report free space.
Str	--trimSpace	Trim free space.

<i>Flg</i>	<i>Arg</i>	<i>Option-Name</i>	<i>Description</i>
		Optimization parameters:	
		<code>--cleanup</code>	Clean up storage on volume - remove any BDO-related temporary files on the target volume. Typically, this would be used only if there was an abnormal BDO termination, such as a workstation power failure while running BDO.
			 WARNING: Only one BDO operation should be run at a time on a given volume. Multiple invocations will conflict, and it is possible for a user to interfere with an existing run of BDO by using <code>--cleanup</code> . Use with care.
		<code>--clobber</code>	Respond affirmative with using the <code>--cleanup</code> option if volume needs to be cleaned up.
			 WARNING: Use only when there are no other BDO operations occurring.
<code>-f</code>		<code>--force</code>	Force optimization. Disabled as <code>--dont-force</code> (default).
		<code>--sequence</code>	Enable sequence awareness (default) - parse the files being analyzed to identify associated image sequences for optimal placement on storage space. Disabled as <code>--no-sequence</code> .
			 NOTE: Improper use of <code>--no-sequence</code> can severely degrade playback performance of the transferred files.
		<code>--merge-3d</code>	3D Stereoscopic Optimizer - merges left-eye and right-eye image sequences to create a contiguous data arrangement of the stereoscopic image files. Provides maximum storage performance for real-time stereo playback. Prohibits the <code>--recurse</code> option. Disabled as <code>--no-merge-3d</code> (default).
<code>-d</code>		<code>--directio</code>	Attempt to use direct I/O (default). Disabled as <code>--no-directio</code> .
<code>-b</code>	Str	<code>--bufferSize</code>	Specifies the buffer size in bytes used for I/O (default = 4 MB). Can add 'm' to the option string to indicate megabytes.
<code>-n</code>	Str	<code>--numBuffers</code>	Specifies the number of buffers to use (default = 4).
<code>-t</code>	Str	<code>--numThreads</code>	Specifies the number of worker threads to use (default = 4).
<code>-M</code>	Str	<code>--maxbps</code>	Specifies maximum transfer rate in bytes per second. Can add 'k' or 'm' to the option string to indicate kilobytes or megabytes. Use to reduce the effect on read performance while optimizing a given volume. Elapsed time will increase when BDO performance is throttled.

<i>Flg</i>	<i>Arg</i>	<i>Option-Name</i>	<i>Description</i>
	Str	--policy	Worker thread scheduling policy.
	Str	--priority	Worker thread priority.
		--verify	Verify an optimize operation upon completion (default). Provides an extra level of data integrity verification. Disabled as --no-verify.

Options controlling output:

-o	Str	--detail	Choose form of output details. Valid strings are 'quiet', 'summary' (default), 'detailed', and 'verbose'.
----	-----	----------	---

Version and help options:

-V	opt	--version	Display version information.
-h		--help	Display help information.
-!		--more-help	Display help information with page scrolling feature.
->	opt	--save-opts	Save current options to a configuration file for later use. The full path of the file to be saved (with name) must be specified.
-<	Str	--load-opts	Load options from a configuration file. The full path of the file (with name) must be specified. Disabled as --no-load-opts; may appear multiple times on the command line.

To view option preset mechanisms for a specific client operating system, view the command usage information on the client using the "-h" option (the mechanisms are shown toward the end).

DATAOPTIMIZER COMMAND EXAMPLES

File Layout Analysis

To perform an analysis on a specific media file, add the directory path and file name to the BDO command:

```
$ bdo /mnt/wsd1/scene3.mov
```

Program Output:

```
bdo - Bright Technologies Data Optimizer
(-h for help) Email to support@4bright.com
Source: /mnt/wsd1/scene3.mov
Recurse: false (Default)
Sequence Aware: true (Default)
Free Compact: false (Default)
Analyze Free Space: false (Default)
Optimize: false (Default)
Output detail: Summary (Default)
```

Summary of Analysis

```
One directory was evaluated.
No sequences and one file was analyzed.
Optimize only if specific performance problems are being seen.
```

In this first example, the file analysis did not detect any read performance issues. Therefore, the analysis results did not include a direct recommendation for optimization.

The following BDO command will perform an analysis on media files contained in the “new-project” directory (only files in the top level of the directory):

```
$ bdo /mnt/wsd1/new-project/
```

Program Output:

```
bdo - Bright Technologies Data Optimizer
(-h for help) Email to support@4bright.com
Source: /mnt/wsd1/new-project/
Recurse: false (Default)
Sequence Aware: true (Default)
Free Compact: false (Default)
Analyze Free Space: false (Default)
Optimize: false (Default)
Output detail: Summary (Default)
```

Summary of Analysis

```
One directory was evaluated.
One sequence and 2000 files were analyzed.
Optimization is necessary.
```

Here in the second example, the file analysis detected potential read performance issues. A direct recommendation for optimization is provided with the analysis results.

To include files in sub-directories of the target path in the analysis, add the option “-r” to the command:

```
$ bdo -r /mnt/wsd1/new-project/
```

Add the option “-O detailed” to the command to view the analysis summary for each sub-directory in the target path:

```
$ bdo -r -O detailed /mnt/wsd1/new-project/
```

To view technical details of the analysis (if available), use the option “-O verbose” with the command:

```
$ bdo -r -O verbose /mnt/wsd1/new-project/
```



NOTE: The technical details presented with this option can be lengthy when thousands of files are analyzed.

File Layout Optimization

If a BDO analysis indicates that optimization should be performed, add the option "--optimize" to the command to invoke the BDO optimize operation.



NOTE: Best optimization and performance will be achieved if BDO is the only writer to the workspace during an optimize operation.

Choose your optimization target with care. BDO consumes bandwidth and will cause read performance to degrade on the workspace during the optimize operation.



CAUTION: The larger the amount of media clips to be optimized, the longer BDO will run (elapsed time). For example, it is possible to optimize an entire workspace in one BDO invocation; depending on the amount of data and the condition of the workspace, this operation may take many hours.

Optimize a specific media file:

```
$ bdo --optimize /mnt/wsd1/scene3.mov
```

Optimize the media files in the top level of the "new-project" directory:

```
$ bdo --optimize /mnt/wsd1/new-project/
```

To include files in sub-directories of the target path in the optimize operation, add the option "-r" to the command:

```
$ bdo -r --optimize /mnt/wsd1/new-project/
```

Add the option "-b" to specify a buffer size to be used with the optimize operation:

```
$ bdo -r --optimize -b 13m /mnt/wsd1/new-project/
```



NOTE: When optimizing a large sequence of files, all of which being the same resolution or file size, use a buffer size slightly larger than a single file size for best transfer rate. The example above would be applicable for 2K image files (at a size of 12.16 MB per file).

BRIGHT SOFTWARE FILE SEQUENCE AWARENESS

DataOptimizer is one of Bright Technologies' high-performance, sequence-aware media file management applications. By using multiple threads reading and writing multiple buffers, it can fully utilize the available hardware resources and improve throughput over standard utilities. Optimize large sets of file sequences with ease - just specify the directory locations, and optimal arrangement of any sequences contained therein is handled automatically, no matter the sequence size.

When an optimize operation is started, the source arguments are analyzed. If any arguments are directories, the contents are sorted by name and any sequences are detected.

A sequence is defined as consecutive files which have names in the format of `<prefix>[n+]<suffix>` where `[n+]` is a variable length number of digits. Files which are selected as belonging to the same sequence will have the same prefix, suffix, and number of sequence digits. The file sequence number must be contiguous with previous files in the sequence, and it must also be the last numeric field in the file name. For example, the following two files would be detected as belonging to the same sequence:

```
mverse-day17-000500.dpx  
mverse-day17-000501.dpx
```

Alternatively, these two files would not be considered as belonging to the same sequence:

```
scene8-000500-2011-09-25.dpx  
scene8-000501-2011-09-25.dpx
```

Once any sequences are detected, the source files are opened for access. The program then iterates over the source files, implementing optimal arrangement on the storage. The file optimize operations are performed in sequence (the same order that the source files are read), providing contiguous allocation on the storage space as much as possible.

3D STEREOSCOPIC OPTIMIZER

The BDO “--merge-3d” option provides a powerful method for creating a contiguous sequence of 3D image files on your high-performance storage space. Just specify the “--merge-3d” option with the target directory containing right-eye and left-eye sequences to be merged, and run it. The files will be re-arranged according to a contiguous 3D sequence format and available for review by any real-time stereo 3D media player application.

By re-arranging the left-eye and right-eye sequences, where the image files are stored in a contiguous stereoscopic order, the storage access time is drastically reduced - unnecessary disk drive head seeks are avoided. This eliminates the need for two workspaces or volumes typically required for 3D workflows.



NOTE: The right-eye and left-eye sequences must reside in the same directory.

3D Layout Analysis

Here is an example of performing an analysis on a project directory containing a set of left-eye and right-eye sequences of 2000 files each:

```
$ bdo --merge-3d -O detailed /mnt/wsd1/giant-monster-attack_3D/
```

Program Output:

```
bdo - Bright Technologies Data Optimizer
(-h for help) Email to support@4bright.com
Source: /mnt/wsd1/giant-monster-attack_3D/
Recurse: false (Default)
Sequence Aware: true (Default)
Merge 3D: true (Command Line)
Analyze Free Space: false (Default)
Optimize: false (Default)
Output detail: Detailed (Command Line)

Analyzing directory /mnt/wsd1/giant-monster-attack_3D/
  Number of files:                4000
  Files Out of Sequence:          3958
Optimization is necessary.

Summary of Analysis

One directory was evaluated.
One sequence and 4000 files were analyzed.
Overall, Optimization is necessary.
```

When analyzing a directory containing two stereoscopic sequences, make sure that the sequences are detected as “One sequence” (as shown above in the analysis summary) when using the “--merge-3d” option.

If, instead, the example above showed “Two sequences and 4000 files were analyzed.”, that would indicate that the two sequences were not being recognized as a single 3D sequence.

3D Layout Optimization

Continuing with the previous example shown, optimize the 3D sequence contained in the project directory:

```
$ bdo --optimize --merge-3d /mnt/wsd1/giant-monster-attack_3D/
```

Program Output:

```
bdo - Bright Technologies Data Optimizer
(-h for help) Email to support@4bright.com
Source: /mnt/wsd1/giant-monster-attack_3D/
Recurse: false (Default)
Sequence Aware: true (Default)
Merge 3D: true (Command Line)
Analyze Free Space: false (Default)
Optimize: true (Command Line)
Direct I/O: true
Max buffer size: 4.00 MB (4194304) (Default)
Current buffer size: 4.00 MB (4194304)
Num Buffers: 4 (Default)
Num Threads: 4 (Default)
Verify: Size|Digest|Content (Default)
Clobber: false (Default)
Cleanup: false (Default)
Force: false (Default)
Output detail: Summary (Default)

Optimizing sequence "/mnt/wsd1/giant-monster-attack_3D/
gmbb.l-####.dpx {S:0000-3999}"

Optimizing 4000 files.

"/mnt/wsd1/giant-monster-attack_3D/gmbb.l-0000.dpx"
to "/mnt/wsd1/giant-monster-attack_3D/gmbb.r-1999.dpx"

"/mnt/wsd1/giant-monster-attack_3D/": Summary prior to optimization.

                Files: 4000
                Fragmented files: 0(0.00%)
                Out of sequence files: 3958(98.95%)
                Sequences: 1
                Fragmented Sequences: 0(0.00%)
                Sequences out of sequence: 1(100.00%)

"/mnt/wsd1/giant-monster-attack_3D/": Summary after optimization.

                Files: 4000
                Fragmented files: 0(0.00%)
                Out of sequence files: 0(0.00%)
                Sequences: 1
                Fragmented Sequences: 0(0.00%)
                Sequences out of sequence: 0(0.00%)
```

APPENDIX A: TERMS AND ACRONYMS

BDM - Bright DataMover.

BDO - Bright DataOptimizer.

BDW - Bright DataWrangler.

BRLM - Bright License Manager utility.

BTI - Bright Technologies, Inc.

LUNs - Logical unit numbers; typically refers to partitions or logical volumes on storage devices.

MDC - Metadata controller in a SAN environment.

RAID - Redundant array of independent disks.

SAN - Storage area network.

Workspace - shared storage space accessed through a high-speed storage area network (SAN), where a name-space or volume provided by the SAN is mounted on client workstations.