Esri LAS Optimizer/Compressor

Updates

Revision 1.2.4:

- Fix: rare case where decompression/validation claims zLAS file is invalid when it's actually valid.

- Fix: carriage return sent to active window at end of process when EzLAS run from command line.

Revision 1.2.3:

- Added user specified temp path to which intermediate files will be written.

- Enable the 'Import PRJ file' option on the 64 bit verion of EzLAS when ArcGIS Pro is installed.

- Fix: crash when using the 'Import PRJ file' option when ArcGIS 10.4 and higher is installed.

Revision 1.2.2:

- Digitally signed executable.

Revision 1.2.1:

- Fix: when using the command line the process may 'validate' instead of compress due to an uninitialized variable for validate command line switch introduced in v1.2.

- Remove version number from the application's exe file name.

Revision 1.2:

- Support for LAS 1.4, all point record formats.

- Output zLAS files are backward compatible when LAS 1.3 or earlier payload is used.

- Retain original time stamp upon decompression if las file not altered in any way.

- Command line switch to verify integrity of zLAS files.

- Option to stop process when encountering error with a file.

- Drag and drop files/folders.

- Do not overwrite log file.

Revision 1.1:

- Added support for parallel decompression.

Overview

The Esri LAS Optimizer improves archiving, sharing, and use of LAS format lidar. Optimization is accomplished in several ways:

- Lossless compression
- Spatial indexing
- Statistics generation
- Efficient direct use without need for decompression

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The compression ratio the optimizer can achieve is typically much better than generic compressors. This is because it's targeted specifically for LAS. In addition to a high compression ratio, the compression is lossless so you needn't worry about losing any information. On top of this, the compressed files are directly usable in ArcGIS via the LAS dataset. Just add the files, which are named using the extension *.zlas, to a LAS dataset, like regular LAS files, and you're ready to go. No decompression is necessary. Because the data are also spatially indexed and have statistics they're more efficiently accessed and easier to use than regular LAS.

Direct use of zLAS files containing LAS 1.0 to 1.3 payloads requires ArcGIS 10.2.1 or higher. Direct use of zLAS with LAS 1.4 payloads requires ArcGIS 10.3 or higher.

Requirements

- Windows 7 x32/x64 or higher.
- Some machines may require a Microsoft C++ Redistributable Package be installed if certain libraries used by the compressor are not already on the system. See the Notes section for more information.
- ArcGIS 10.1 or higher is needed *only* for using the option to import spatial reference information from an Esri PRJ file. Otherwise, ArcGIS is not needed.

Usage

This section covers the usage of the tool and its options.

Input: here you provide either an individual file or a folder containing multiple files. If using a folder you can chose to have the optimizer go into sub-folders. This is also the place where you indicate if you're compressing or decompressing. When compressing via a folder, the tool will search for files with the *.las extension. When decompressing, it looks for *.zlas. You can drag and drop files and folders from Windows Explorer to here as long as what you're dropping is appropriate based on the current settings.

Point spacing estimation: the optimizer builds a spatial index to make direct use of the compressed data more efficient. To do this it uses the average point spacing of the data. If Esri *.lasx files already exist (see 'Notes' section below) the point spacing is obtained from them. Without that, you can have the optimizer scan through the point records. Alternately, you can choose to have it just look at the extent and point count from the header to estimate a spacing, which may be a little faster but tends to be less accurate, or if you know the spacing you can provide the value. Note, the choice made here only applies if no up to date *.lasx exists.

Rearrange points: this option is on by default and is used to re-order the point records to optimize data access and minimize file I/O. This is beneficial when using the compressed LAS data directly. It's also an advantage if and when the data are decompressed since that optimal order is preserved along with the index that is output to an auxiliary *.lasx file. Note this option will technically alter the LAS file, the decompressed version will not be identical to the input, but the actual point record content is retained

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entirely. It's our experience at Esri that virtually all post processed (e.g., tiled, classified) LAS has already had the point order changed relative to the original scan order and changing the order again for the sake of accessing the data more efficiently is an improvement to the data. This is why the option is on by default. If the input data have already been rearranged (see 'Notes' below), the optimizer will recognize this and keep that order, saving itself some work.

Import PRJ file: this option is on by default and is used to replace or add spatial reference information from an Esri PRJ file, if one exists, into the corresponding compressed output. Unchecked, if a *.prj exists, it will only be copied next to the output, rather than being added into it. If checked, the output will have the PRJ information embedded into it and will not have a 'sidecar' prj file. The decompressed version of the LAS file will also have that information embedded in its header. For this reason, the decompressed LAS file will not be identical to the input. Considering a PRJ is present it would seem the change is for the better, it's fixing a shortcoming of the original LAS, and is why the option is on by default.

Note this is the one option that requires an ArcGIS installation. It will be disabled if a compatible version of ArcGIS is not found on the system. By 'compatible' we mean that when using the 32-bit version of the optimizer you need a 32-bit version of ArcGIS (e.g., Desktop). For the 64-bit version, you need a 64-bit version of ArcGIS (e.g., server). We recommend running the 64-bit version of EzLAS. Only if you need the 'Import PRJ file' option and have a 32-bit version of ArcGIS should you use the 32-bit version of EzLAS.

Advanced options: there are three features available from this sub-dialog. System resource usage, file error handling, and temp file path.

System resource usage: enables you to control the amount of CPU resources that will be allocated for optimization/compression and decompression. It's a relative amount offered in increments: 25%, 50%, 75%, and 100%. This percentage relates to the number of available logical processors that will be used in parallel. For example, on a quad core machine with 8 logical processors a value of 50% will spawn 4 threads. By default, the percentage is 100%, to use all computing resources. This is the recommended value and should only be changed if there's a specific reason why all resources should not be allocated, such as if the application is being run in a server environment where one process should not be allowed to dominate the resources of the machine.

File error handling: with this turned on the process of compressing or decompressing multiple files will halt if an error occurs with any file. The default is off, to allow the process to continue working on the remaining files. Regardless of whether this option is on or off, all problems are always reported in the output log file.

Temp file path: this optional path is used to write scratch files when the rearrange point option is being used. Those scratch files can be large (depends on the size of the input LAS file(s)) so the ability to write them to a different, and potentially faster, drive than the target drive for the zLAS file output can improve I/O performance.

Output: here you specify an output folder. If it doesn't already exist it will be created. Depending on the option you picked, either the compressed or decompressed files will be written to this location. You can choose to overwrite files if they already exist. Progress is reported on the dialog and an output log file, called EzLasLog.log, is written to the output folder. If the log already exists a unique name will be generated (e.g., EzLasLog (1).log).

Start, Pause, and Cancel

Pressing the start button will initiate the process. While processing the Start button turns into 'Pause' which can be used to temporarily halt the process. The Cancel button will terminate the process but leave the dialog up. To quit use the 'x' in the upper right hand corner of the dialog.

Command line

EzLAS supports command line use as well as a graphical user interface. The command line options are listed below. The command line help can also be returned by typing "EzLAS /?" in a console window.

EzLAS input output [/D] [/S] [/R] [/PS=[value]] [/P] [/C=[number]]

input	Specifies the directory or LAS file name.
output	Specifies the output directory name.
/O	Indicates that the process can overwrite existing output files.
/D	Indicates that the process is for decompression.
/V	Indicates that the process is for verifying the integrity of zLAS files.
/S	Indicates that sub directories should be included.
/R	Indicates that the process should rearrange point records.

/PS=   Specifies one of the three point spacing estimation options.
          PS=S (no space in between) indicates 'estimate by scanning file'.
          PS=H (no space in between) indicates 'estimate using header info'.
          PS=[number] indicates 'use the specified number' (example: PS=1.5).

/ES   Indicates that the process should stop if a file error occurs.

/P   Indicates that the process should replace LAS file's projection with Esri's Prj file if
        one exists.

/C=   Specifies the CPU power to be used in percentage.
        Example: C=50 (no space in between) specifies 50% of the CPU power.
        Note that the input usage will be snapped up to one of the following
        four predefined values: 25, 50, 75, and 100. For example,
        input C=10 will be changed to C=25, and C=80 changed to C=100.

/Temp=   Specifies the directory name for scratch files.

/?   Prints the command line usage to the console window.

Use Ctrl-C to cancel the process.

Notes

*.lasx files are auxiliary files that contain statistics and spatial indexes that LAS files lack. These files can be made by ArcGIS. If they exist they can speed up the compression. They are also output as a function of decompression so someone using the decompressed LAS can take advantage of them. Basically, if we've done the work of calculating statistics and building indexes we want to preserve that information, going both into compression and coming out of it.

Rearranged LAS files have had their point record order altered to optimize spatial index queries. This reduces I/O and is beneficial for large (1GB+) files or almost any LAS file being accessed across a network. Rearranged LAS can be made via a custom GP tool which is available as part of the 'LAS Custom GP Tools' which can be found on Esri's 3D Resource Center. The EzLAS optimizer has an option to rearrange points as well. It can also detect if the input has already been rearranged and will not bother to re-sort if it doesn't need to.

Some people have experienced an error stating the side-by-side configuration is incorrect when trying to run EzLAS. See graphic:
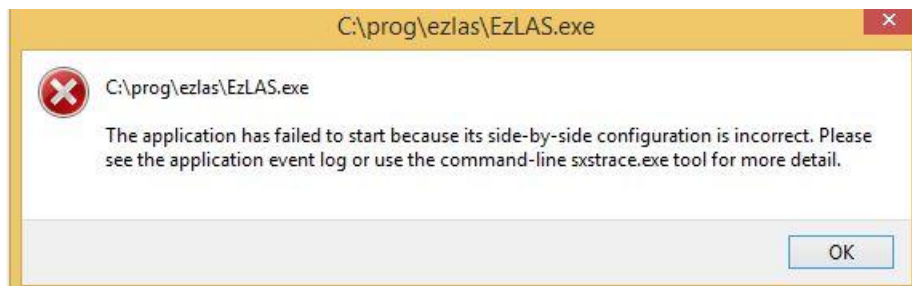
This can be an indication a Microsoft C++ Redistributable needs to be installed. For the 64 bit version of EzLAS you need '*Microsoft Visual C++ 2008 SP1 Redistributable Package for (x64)'.* Otherwise use '*Microsoft Visual C++ 2008 SP1 Redistributable Package (x32/x64)'.*

Limitations and Terms of Use

-   Compressed files can't be edited in ArcGIS (e.g., can't change LAS class codes).
-   Terms of use are found on the Esri Resource Center. Use of the optimizer constitutes agreement with these terms of use.

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