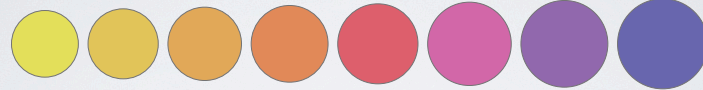# libLAS

Open Source Point Cloud Processing

HISTORY

- Software APIs and tools for manipulating ASPRS LAS data

- Started in 2007, first release in 2008

  - 20+ releases since 2007

- BSD license

OPEN SOURCE

- Community-driven

- Public source repository

- Public bug tracker

- Public mailing list

- Liberal license

SCOPE

- Feature-rich

- Shoulders (GDAL, LASzip, Boost)

- Multi-platform (Win32/64, OS X, Linux)

- Multi-language (C/C++/Python/.NET)

AUDIENCE

- Software developers

- System integrators

- Processing pipelines

SOFTWARE

- Cadcorp SIS Desktop

- Myriax Eonfusion

- LASERDATA LIS

- LizardTech LiDAR Compressor

- SAGA GIS

- ERDAS LPS

- Safe FME

- TopoDOT Point Cloud Processing Tool Suite

http://trac.liblas.org/wiki/WhoUsesLibLAS

PROJECT ACTIVITY

- 11 commiters

- 119 mail list subscribers

- 4-12 IRC members #liblas - irc.freenode.net

- 60 bug tracking members

SPONSORSHIP

- Iowa Department of Natural Resources

- LizardTech

- US Army Corps Cold Regions Research and Engineering Laboratory

FEATURES

- Filtering

- Transformation

- Reprojection (GDAL)

- Indexing and Tiling

- Compression (LASzip)

FORMAT SUPPORT

- ASPRS LAS 1.0, 1.1, 1.2, 1.3 (points only)

- LASzip - http://laszip.org - compressed LAS

- TerraSolid .bin

- Oracle Point Cloud

- ASCII

FILTERING

```
$ las2las --input in.las \
          --output out.las \
          --drop-intensity "<=1000" \
          --keep-scan-angle "<=15" \
          --keep-classes 2
```

COLOR ASSIGNMENT

```
$ las2las -i input.las \
        --color-source image.img \
        --output output.las \
        --file-format 1.2 \
        --point-format 3 \
        --color-source-scale 256 \
        --color-source-bands 3 1 2
```

REPROJECTION

```
$ las2las  --input epsg26915.las \
           --output wgs84.las \
           --scale 0.000001 \
                   0.000001 \
                   0.01
           --a_srs EPSG:4326 \
           --t_srs EPSG:26915
```

VERTICAL TRANSFORM
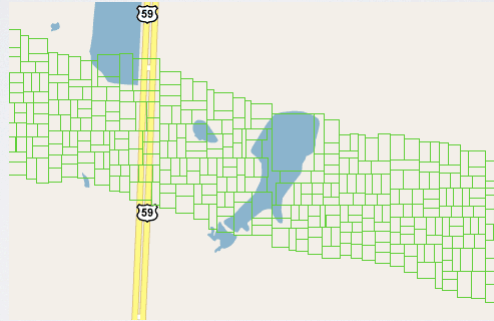
```
$ las2las --input srs.las \
          --t_srs EPSG:26915+5703
          --output navd88.las
```

ADDING VLRs

```
$ las2las in.las \
        --add-vlr CUSTOM_VLR \
        42 "A VLR description"\
        "myfile.vlr"
```

CHIPPER

```
$ lasblock in.las --capacity 10000
```

INDEXING

- Octree with optional z-binning

- VLR serialization

- Iterator-style access

- Frustum queries in the future?

COMPRESSION

- Arithmetic encoder by Martin Isenburg

- LGPL license - http://laszip.org

- Standard LAS header with a VLR

- 4:1 - 20:1

COMPRESSION

- Transparently enabled by libLAS

- Sequential, poor for random access

- Excellent for over-the-wire and archival purposes

PYTHON

```python
>>> from liblas import file
>>> f = file.File('file.las', mode='r')
>>> for p in f:
...     print 'X, Y, Z: ', p.x, p.y, p.z
```

C++

```cpp
ifstream ifs;
ifs.open("input.las", ios::in | ios::binary);

liblas::Reader reader(ifs);

liblas::Header const& header = reader.GetHeader();

while (reader.ReadNextPoint())
{
    liblas::Point const& p = reader.GetPoint();

    cout << p.GetX() << ", "
         << p.GetY() << ", "
         << p.GetZ() << "\n";
}
```

LIBPC

- Feature creep of libLAS

- Variable schema

- Format drivers

- Impedance mismatch

GDAL

- Format drivers

- Strive for performance, aim for flexibility

- 118 raster formats (2/8/2011)

- Industry-wide use

GDAL

- Dataset

- Band

- Block

- Metadata

- Pixel

- Coordinate Reference

GDAL

- Format drivers

- Strive for performance, aim for flexibility

- 118 raster formats (2/8/2011)

- Industry-wide use

POINT CLOUD COMMONALITY

- Irregularly-spaced points

  - X, Y, Z or r, θ, Φ

- Blocked or sequential storage

POINT CLOUD COMMONALITY

• Schema

• Coordinate reference

• Metadata

DRIVER CAPABILITIES

• Write

• Read

• Random Read

• Fast windowed/frustum query

• ...

DRIVER CAPABILITIES

- Write

- Read

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- Fast windowed/frustum query

- ...

libLAS

Documentation »

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libLAS
liblas

libLAS Python bindings, including Windows versions, now available via PyPI http://pypi.python.org/p...
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yesterday · reply

libLAS 1.6.0 final now released! See http://is.gd/Nx2ZLX for more details and download from http://liblas.org OSGeo4W for windows #lidar
yesterday · reply

What does Dr. Horrible have in common with Point Clouds? A fair bit, it turns out: http://t.co/P8xPe5p
7 days ago · reply

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libLAS - LAS 1.0/1.1/1.2 ASPRS LiDAR data translation toolset

libLAS is a C/C++ library for reading and writing the very common *LAS LiDAR* format. The ASPRS LAS format is a sequential binary format used to store data from LiDAR sensors and by LiDAR processing software for data interchange and archival. See Features for more details on what libLAS can provide a LiDAR software developer. See Getting Started with libLAS for how to get started using the library.

libLAS' initial development was supported in 2007-2008 by the IGSB of the Iowa DNR for use in its state-wide LIDAR project. Ongoing support for libLAS is provided by a number of organizations including the U.S. Army Cold Regions Research and Engineering Laboratory.

libLAS builds upon by Martin Isenburg and Jonathan Shewchuk of LLNL/UC Berkeley in their LAStools project to do a number of things. First, the libLAS focuses almost completely on providing an easy-to-program-with library for software developers wishing to implement the LAS specification in their own software. Second, libLAS exists to provide a truly open source library (see License for terms) – LAStools has no explicit licensing terms. Third, libLAS exists to provide advanced functionality and concentrate almost solely on the specification – not LiDAR data processing in general. libLAS a building block for developers to use to implement their own LiDAR data processing when working with ASPRS LAS data.

For more information, *this document* provides a comparison and description of the relationship of libLAS to LAStools.

See also: http://trac.liblas.org contains the previous incarnation of the libLAS website. If you can't find something here, it should still be there.

License