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OPEN SOURCE #3 - BIGTIFF

IN THIS THIRD INSTALLMENT OF OPEN SOURCES, FRANK WARMERDAM DISCUSSES "BIGTIFF", AN EXTENSION TO THE TIFF FORMAT FOR LARGE FILES THAT BREAKS THE 4 GB BARRIER, AND AN IMPLEMENTATION IN THE OPEN SOURCE LIBTIFF LIBRARY.

The GeoTIFF image file format has become a mainstay for geospatial raster data exchange and processing since it was introduced as an extension to the TIFF format more than a decade ago. The success of GeoTIFF is built not only on the flexibility of the format, its efficiency, and its open specification, but also on the availability of an open source library implementing the format.

While TIFF was first introduced in the 1980's by Aldus, its popularity grew rapidly after Sam Leffler and SGI released an open source library, libtiff, implementing the format. This made it possible for many software packages to easily support the format and minimized compatibility problems. In the early 1990's when the GeoTIFF extension was introduced it was also provided with an open source library, libgeotiff, built on top of libtiff.

But as image sizes continue to grow, one aspect of the format has become a significant thorn in the side of geospatial users: the lack of support for files larger than 4 gigabytes (GB). The limitation comes from the use of 32-bit offsets in the file, and has forced many geospatial users to look for other formats as they try to work large image mosaics.

Towards a Bigger TIFF

Discussion of methods to extend the TIFF format to support files larger than 4GB have occurred on and off since the beginning of this decade when I became a co-maintainer of the libtiff library, but things didn't really get serious until roughly 2005. At that time a detailed specification for a new variant of the TIFF format with support for large files was hammered out on the TIFF mailing list. The new specification was aptly named BigTIFF.

The specification essentially kept the TIFF format the same, except for changing to use 64-bit offsets within the file - potentially allowing files up to 18000 petabytes in size. All other aspects of the format, including the tagging mechanism, the imaging model, and the extensions like GeoTIFF were left unchanged to minimize the disruption involved in migrating to the format.

However, the format was not backward compatible. That is, existing TIFF readers would not be able to read BigTIFF files without upgrading their libraries. For this reason the plan was to upgrade libtiff to support both file formats, and during a change-over period (likely to last several years if not longer) BigTIFF files would only be created when there was a need for large file sizes.

Implementation

Despite good intentions as a libtiff maintainer, I was not able to find the time to properly upgrade libtiff to support BigTIFF. But while BigTIFF implementation in libtiff stalled, one of the BigTIFF specification designers - Joris Van Damme - did implement the format in his own proprietary TIFF library. Meeting for the first time in person at the FOSS4G 2006 conference in Lausanne, Switzerland, Joris and I hatched a plan whereby he would do the implementation in libtiff, while I would assist in finding sponsors to support the development.



Interest and pressure for the upgrade had been growing in the geospatial industry for several years. So when I approached a number of key players in our industry, it did not take long to find forward-thinking organizations who understood the benefit of the upgrade and the value of supporting it in the libtiff context.

The organizations who sponsored the development are WeoGeo, Safe Software, Leica Geosystems Geospatial Imaging and. In addition to providing financial backing for the work, they also all expressed interest in incorporating BigTIFF support in their software packages as rapidly as practical. By virtue of their important roles in our industry, their support should ensure rapid adoption of the BigTIFF format.

Development on BigTIFF support in libtiff is already well under way, and plans are for the library to be released to applications developers by mid-summer. I plan to incorporate this new libtiff, version 4.0, in my GDAL projects 1.5.0 release also planned for this summer, and so open source projects already using GDAL should have support for BigTIFF as soon as this fall. BigTIFF support should also start rolling into proprietary product releases in the months or years following the libtiff 4.0 release.

Links

BigTIFF - <http://www.remotesensing.org/libtiff/BigTIFFProposal.html>

WeoGeo - <http://www.weogeo.com>

Safe Software - <http://www.safe.com>

Leica Geosystems Geospatial Imaging - <http://gi.leica-geosystems.com>

ESRI - <http://www.esri.com>

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