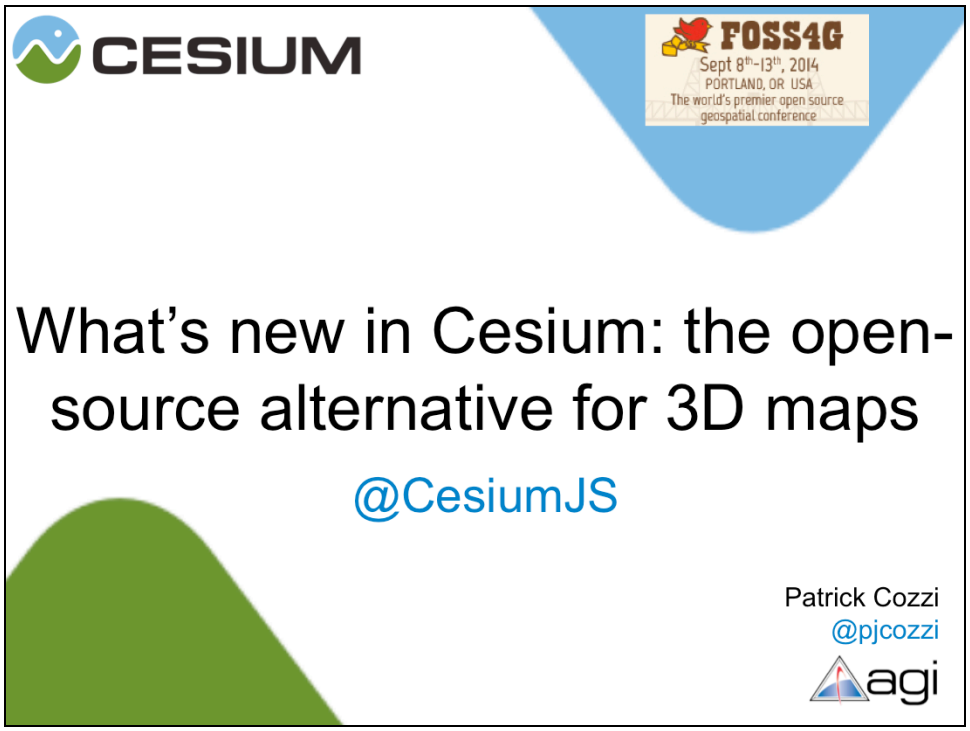
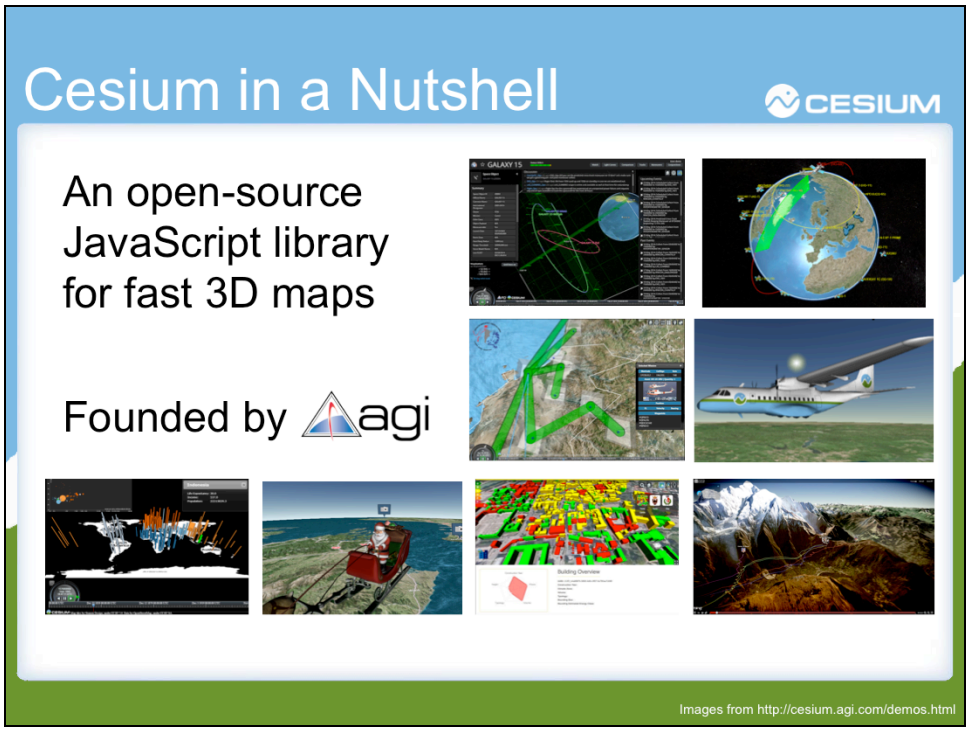

CESIUM
FOSS4G
Sept 8th-13th, 2014
PORTLAND, OR USA
The world's premier open source geospatial conference
What's new in Cesium: the open-source alternative for 3D maps
@CesiumJS
Patrick Cozzi
@pjcozzi
agi



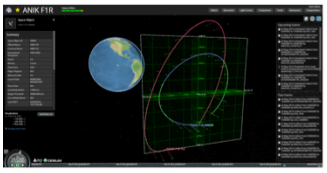
We want widespread adoption so we use the Apache 2.0 license, which means Cesium is free for commercial and non-commercial uses.

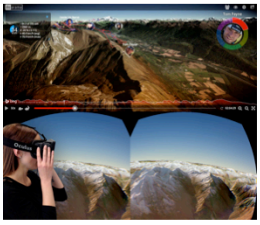
Cesium is used in Aerospace, geospatial, data visualization, entertainment, sporting, and many more fields.

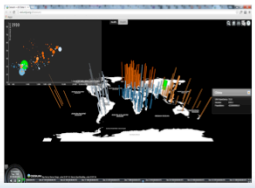
CESIUM

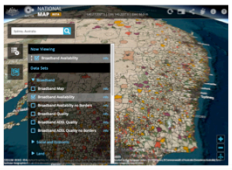
What's New?

Apps first, of course





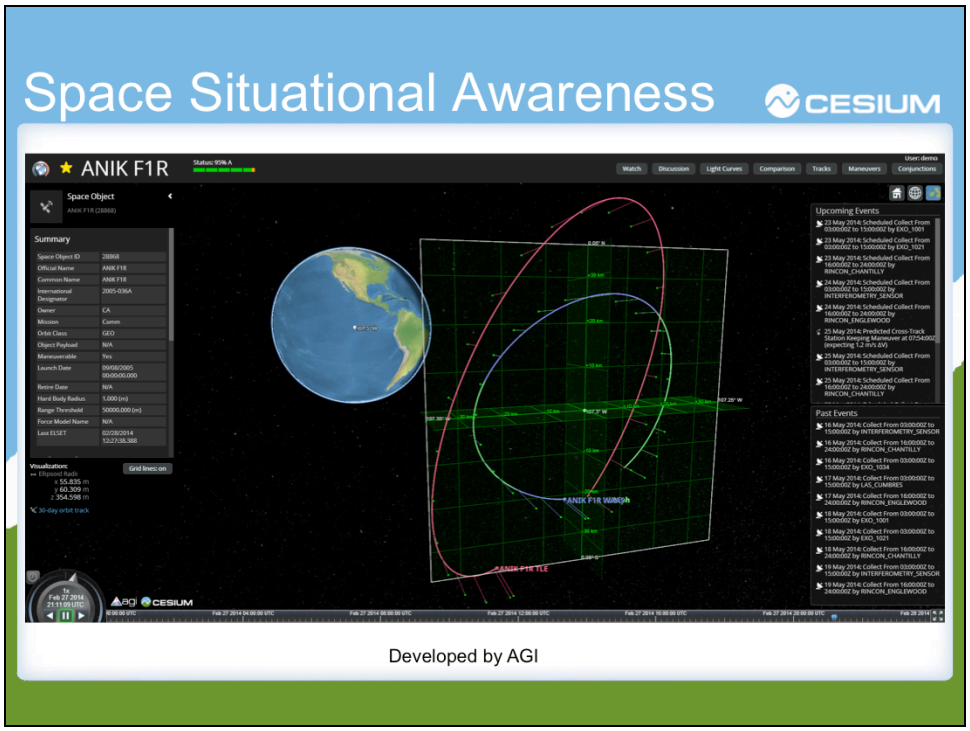




- Animated Santa model used glTF – new since FOSS4G NA 2013
- 48.8% WebGL success rate.
- ~20 million unique visitors
- 26,762 triangles (instanced reindeer)
- Three 1024x1024 texture atlases
- Artwork by Branden Coker (@planetpuncher) using Modo

AGI: http://www.agi.com/

More details: http://cesiumjs.org/demos/noradtrackssanta.html



http://comspoc.com/spacebook/

Developed by AGI

Server-sent events with CZML. Web sockets were available when we needed it and we are only one way.

http://cesiumjs.org/d3cesium/

D3-Cesium demo started a year ago as a hackathon.

Here's a good example of the power of the web. This app uses Cesium for 3D visualization, but then overlays a d3 visualization of the same dataset and other HTML elements to create a rich and interactive experience.

Explanation of d3 visualization. Original concept courtesy Hans Rosling, then brought into d3 as an example by Mike Bostocks.

200 countries over 200 years, each bubble represents a country through time

Bottom axis is average income; further to the right the wealthier the nation

Left axis is average life expectancy; further up the chart, the healthier the nation.

Size of the bubble is relative to the population of the country.

Witness catastrophic events and industrial revolutions by the movement/ growth of these bubbles over time.

NICTA: http://www.nicta.com.au/

http://nationalmap.nicta.com.au/

From http://nicta.github.io/nationalmap/public/info.html

> The National Map is a website for map-based access to Australian spatial data from government agencies. The current version of the National Map is a "beta" service and we will be making lots of changes while we experiment with how users want to use the site and the data services. Later in 2014, it will become a fully supported stable "production" site.
>
> The National Map is an initiative of the Australian Commonwealth Government's Department of Communications and the software has been developed by NICTA working closely with the Department of Communications, Geoscience Australia and other government agencies.

Doarama

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Developed by NICTA

http://www.doarama.com/

Terrain Server: http://www.agi.com/products/stk/terrain-server/

Not all contributors are current active, of course.

Open source since April 2012. In development since February 2011.

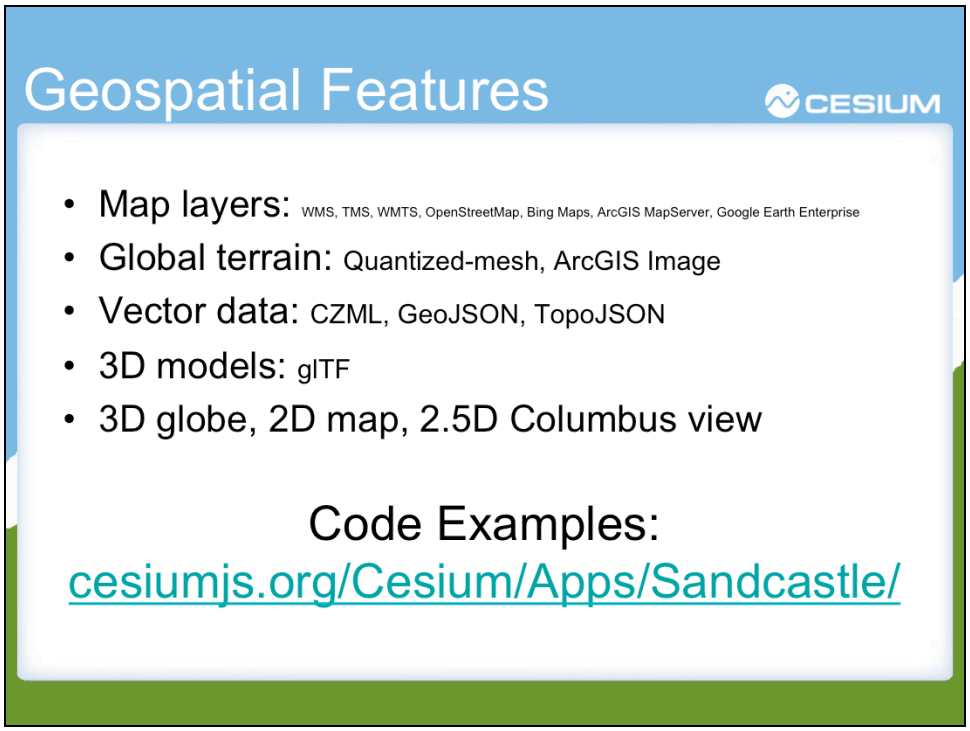
Significant recent momentum from contributors since the 1.0 release on August 1.

July 2013, forum had 600+ topics and 180+ members. The vast majority of the growth has been organic. We have just started increasing our community outreach effort in the past month.

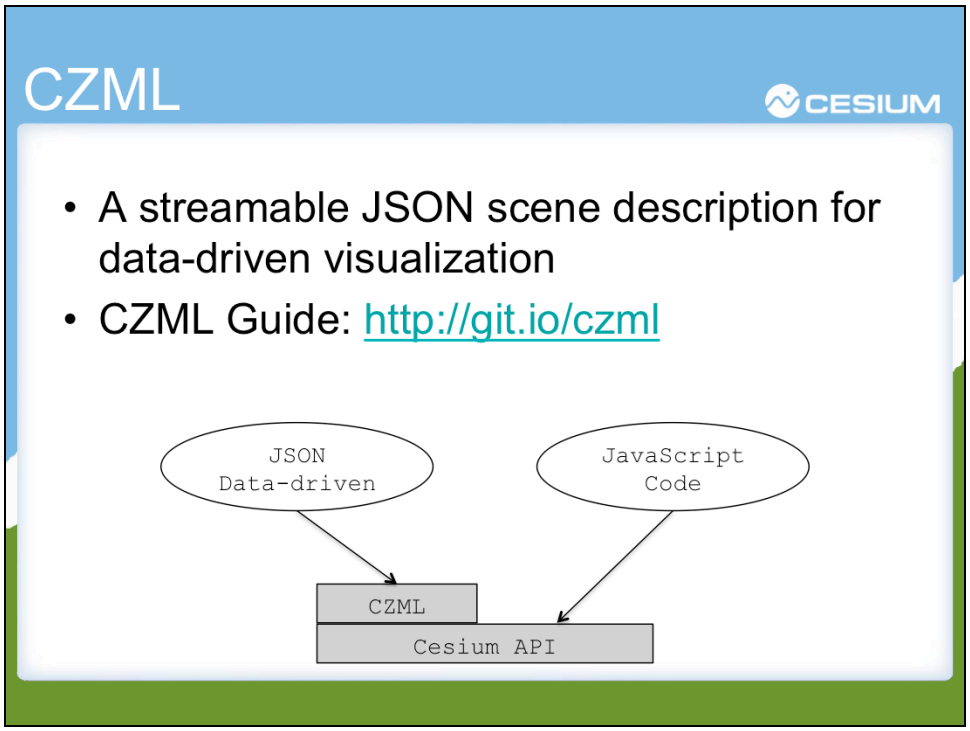
Android and Window tablet support is pretty good, but we are not claiming official support until we do more complete testing. See issues labeled “mobile” in the cesium github repo:

https://github.com/AnalyticalGraphicsInc/cesium/labels/mobile

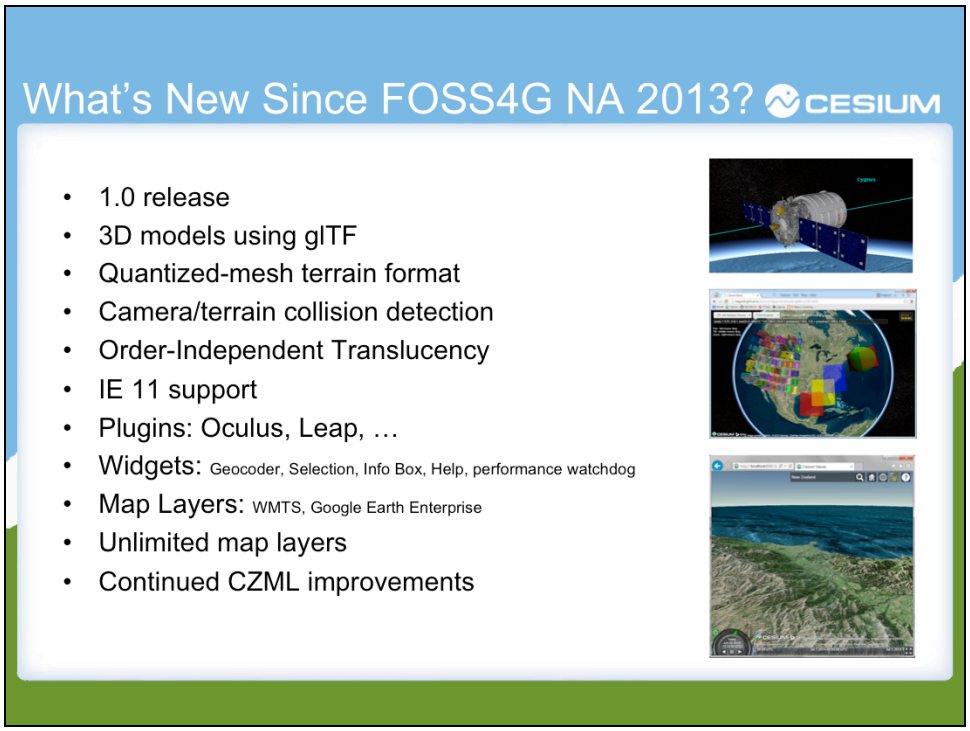
iOS 8 and Safari will support WebGL in the fall. Cesium will follow soon after.



Imagery Layers tutorial (map layers) - https://cesiumjs.org/2013/01/04/Cesium-Imagery-Layers-Tutorial/



We also used CZML to drive Bing Maps for NORAD Tracks Santa. NICTA is working on visualizing CZML in Leaflet.



glTF 3D models were used in the Cygnus mission to the ISS [1], NORAD Tracks Santa [2], and many other apps.

OIT is based on the recent JCGT paper "Weighted Blended Order-Independent Transparency" by Morgan McGuire and Louis Bavoil. See our blog post [3].

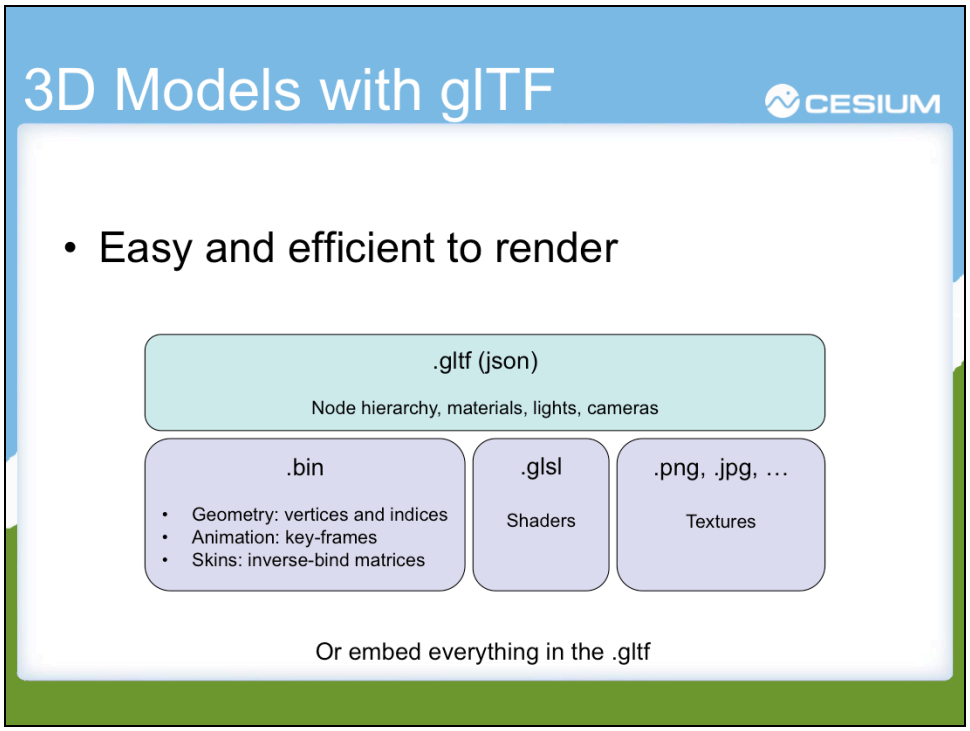
New STK World Terrain dataset with 3-30m resolution in the US, 30m in Europe and Australia, 90m between ~ -60 to 60 degrees latitude, and 1 km elsewhere. This is stored in an open mesh-based format [5].

See all the plugins [6].

Both new imagery providers where external contributions. WMTS will be in 1.1 on September 2.

[1] http://cesiumjs.org/2013/09/18/Cygnus-Mission-Demo/

[2] http://cesiumjs.org/2013/12/23/Building-A-WebGL-Santa-with-Cesium-and-



The number one goal of glTF is that assets are easy and efficient to render in WebGL; we want engines to be “fast by default.”

A glTF asset is composed of JSON describing the asset; binary .bin files containing geometry, animations, and skins; .glsl text files containing shaders; and image files for textures. Binary, glsl, and image files can also be embedded in the JSON.

glTF uses JSON because it is cross-platform, compact, readable, allows validation, and minifies and compresses well.

Binary data is little endian. Binary blobs allow efficient creation of GL buffers and textures since they require no additional parsing, except perhaps decompression. An asset can have any number of binary files for flexibility for a wide array of applications.

Server-side conversion: http://cesiumjs.org/convertmodel.html

Terrain with Quantized-Mesh

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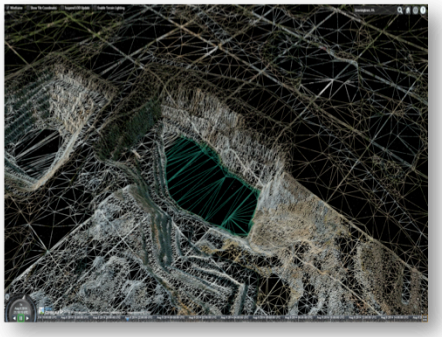
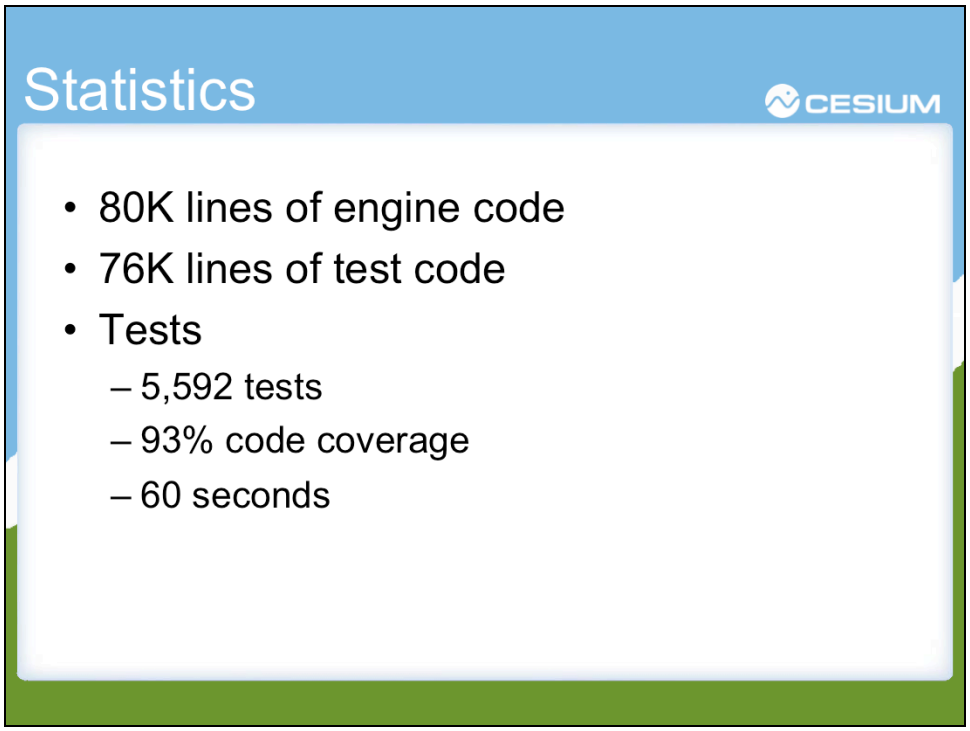
- Triangulated Irregular Network
- Multi-resolution pyramid of tiles
- Multiple datasources, layered together
- Efficient transmission and visualization
- Open format

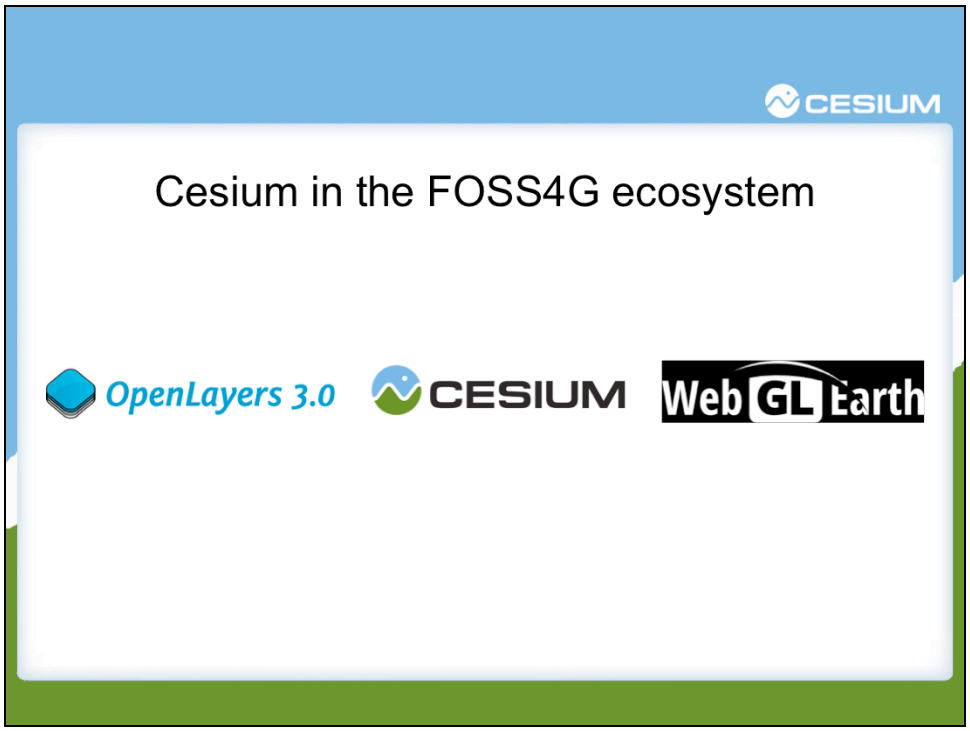


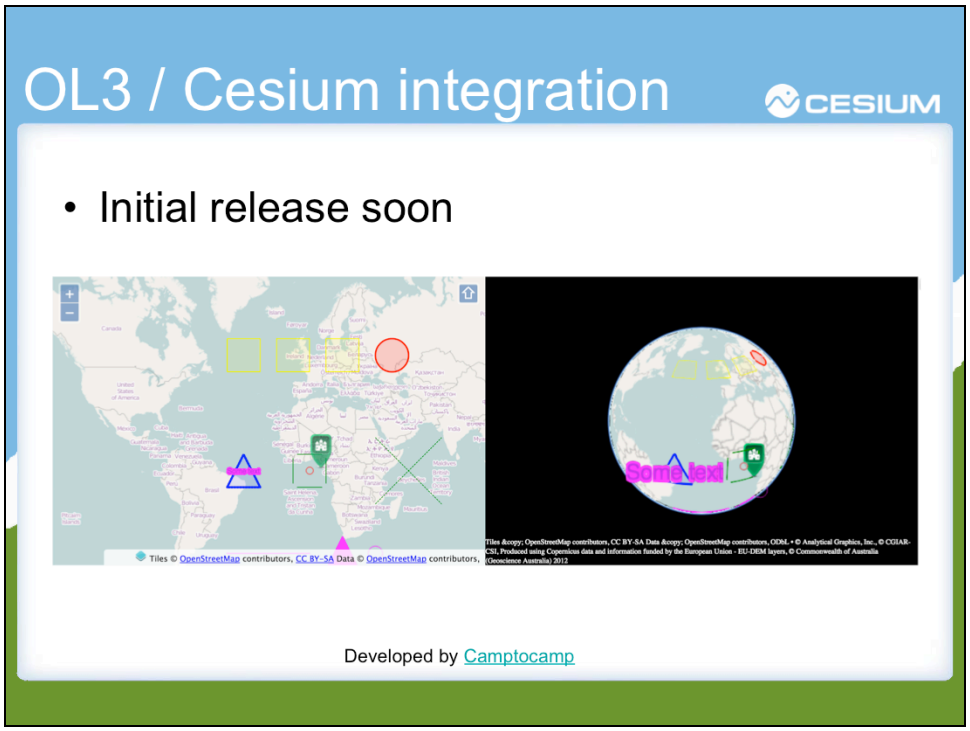
http://cesiumjs.org/data-and-assets/terrain/formats/quantized-mesh-1.0.html



Last July 2013, it was

- 54K lines of engine code
- 55K lines of test code
- 4,138 tests
- 93% coverage


CESIUM
Cesium in the FOSS4G ecosystem
OpenLayers 3.0
CESIUM
WebGLEarth

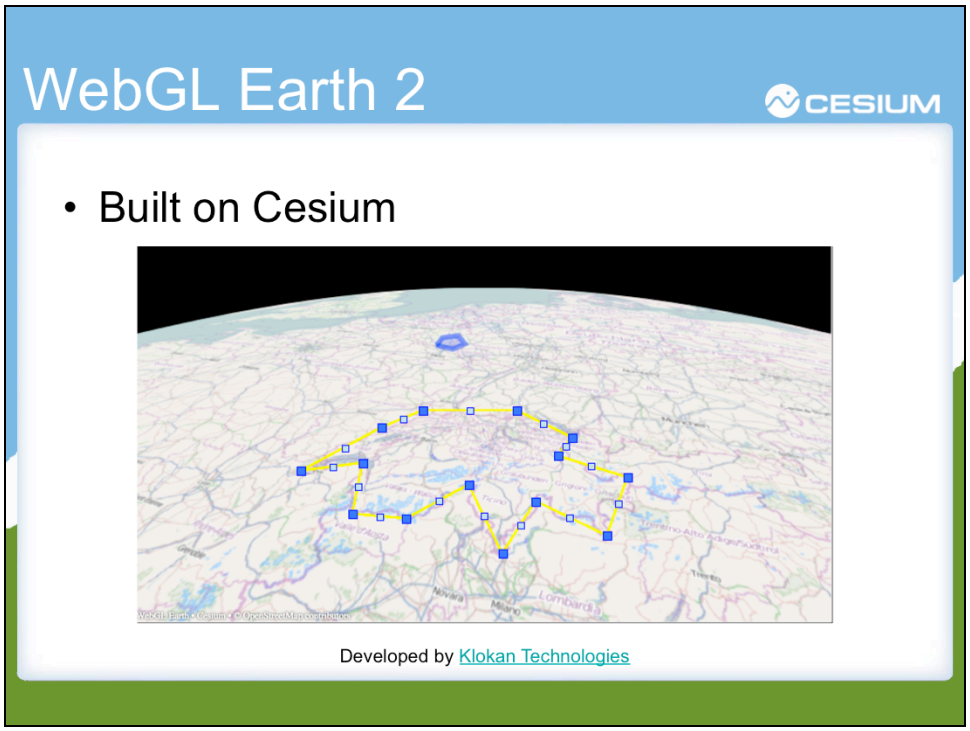


Camptocamp: http://www.camptocamp.com/

Just add the Cesium adapter to an OL3 map.

More info:

- https://groups.google.com/forum/#!topic/ol3-dev/am4soveS4Uw
- http://cesiumjs.org/presentations/SIGGRAPH2014_BOF_Cesium_v1-1.pdf



Exposes a Leaflet compatible API.

I have not used it myself.

More info:

http://blog.klokantech.com/2014/07/webgl-earth-2-leaflet-compatible.html

https://groups.google.com/forum/#!topic/cesium-dev/2kwLaYku0Rw

From Plugins to Cesium

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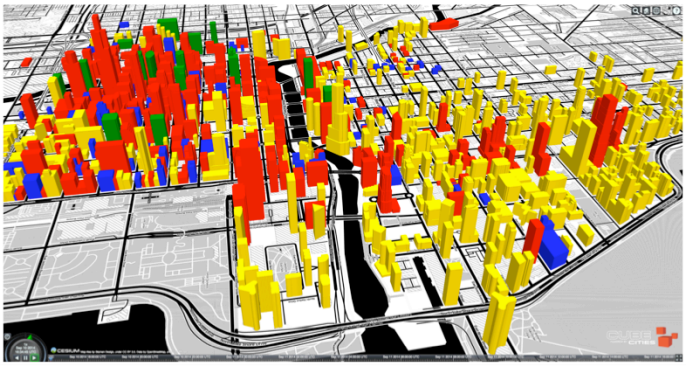
- 64-bit Chrome dropped support for the Google Earth plugin
- NPAPI to be removed from Chrome by the end of the year
- Users like Cube Cities looking at Cesium



64-bit Chrome: http://www.gearthblog.com/blog/archives/2014/09/64-bit-chrome-drops-support-google-earth-plugin.html

NPAPI removal: http://blog.chromium.org/2013/09/saying-goodbye-to-our-old-friend-npapi.html

Cube Cities: http://cubecities.blogspot.ca/2014/09/cesium-future-of-virtual-globes.html

Near-Term Roadmap

- Focus on content. *Content is King*.
  - CZML and KML
- Community growth
- Tell us what you need: cesiumjs.org/forum.html

To support KML and CZML, we will continue to improve and optimize the Cesium graphics engine. We want Cesium to be the fastest platform for KML.


Thanks!
CESIUM
cesiumjs.org
Patrick Cozzi - @pjcozzi - pcozzi@agi.com