



**KLOKAN TECHNOLOGIES**

[www.klokantech.com](http://www.klokantech.com)

# Workshop Vector Tiles

**Petr Pridal <[petr.pridal@klokantech.com](mailto:petr.pridal@klokantech.com)>**

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**GEO+**Summit

# Workshop Vector Tiles

## How to Use (demos)

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# Use of vector tiles

- Web (client rendering, interaction, styles)
- Apps (offline, mobile, embedded)
- Server (server rendering without database, easy deployment on a cluster, caching)
- Geodata distribution
- New vector tile map services

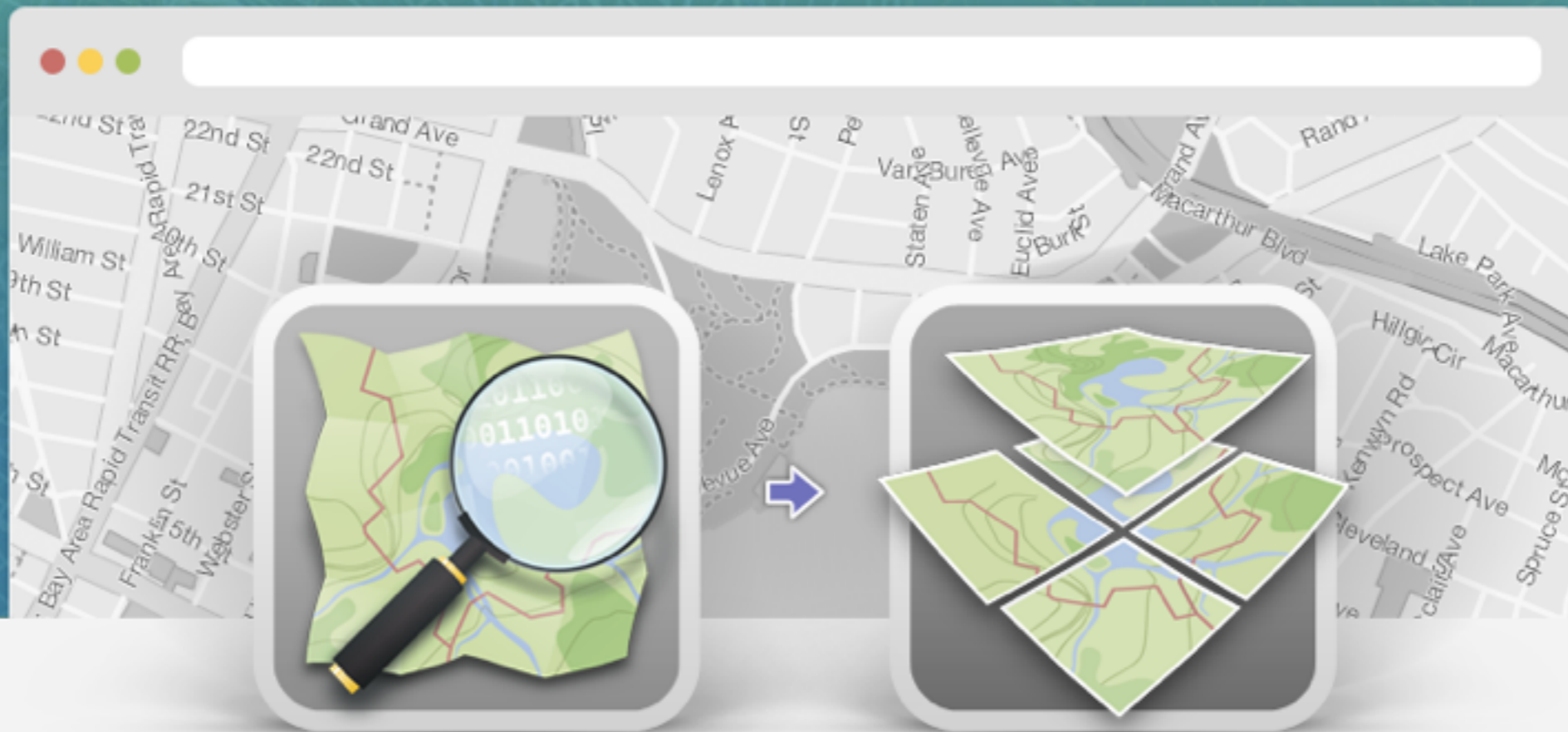
Use case

# Base map with a custom look&feel

Installation of OpenStreetMap world map  
tile server now possible in 5 minutes.  
World has ~50GB.



# Free Vector Tiles from OpenStreetMap



[www.OSM2VECTORTILES.org](http://www.OSM2VECTORTILES.org)



# DEMO

Switzerland on a USB stick

World USB stick soon. Follow Twitter @klokantech

# Web: client viewers

## MapBox GL JS

- Modern web browsers (JS + WebGL)
- Open-Source (BSD license) on GitHub
- <https://www.mapbox.com/mapbox-gl-js/examples/>
- OpenLayers v3 (even no WebGL), Leaflet

Demos: 1 2 3

# Apps: offline, mobile, embedded

## MapBox GL Native

- OpenGL, C++14 (Java, ObjC, Swift, ...)
- Cars, airplanes, navi, desktop, mobile, tablets
- Open-Source (BSD license) on GitHub
- Alternative to Google Maps SDK, ArcGIS Runtime SDK, Apache Cordova / PhoneGap or other WebKit embedding

Demos: 1 2 3





# DEMO

OSM2VectorTiles App  
iOS / Android



World Online, Zürich Offline

# Server rendering (no DB, fast,...)

## TileServer GL & Mapnik

- Map rendering without geo-database
- Fast, easy deep zoom, Retina/HighDPI
- Pre-generated tiles makes sense (depending on data update frequency)
- Easily scalable deployment on a cluster
- Open-Source (BSD license) on GitHub
- Alternative to ArcGIS server, MapServer, ...

**OLD  
MAPS  
ONLINE**



The search engine for old maps.

# DEMO

[www.oldmapsonline.org](http://www.oldmapsonline.org)

Beta of [maps.klokantech.com](http://maps.klokantech.com)  
check <http://osm2vectortiles.org/examples/>

# Rasterisation / OGC WMTS

- Standardised (OGC WMTS) with raster tiles
- Compatible (GIS, Leaflet, OpenLayers, ...)
- Styles:
  - Mapnik: CartoCSS
  - GL: JSON
- Static Map API (same rasterisation)
- New clients use vector tiles, old clients raster



# Geodata distribution + vector tile services

- Downloadable Vector Tiles (.pbf / ProtoBuf) typically in an SQLite package (MBTiles) - see <http://OSM2VectorTiles.org/downloads/>
- Serialtiles spec (textual format for streaming)
- Generators: mapnik, MapBox Studio Classic or tilelive-copy+ [awesome-vector-tiles](#)
- Services <http://server/tiles/{z}/{x}/{y}.pbf> + TileJSON metadata

# Vector tiles combining

- Multiple vector tiles can be combined
- Server side (binary concatenation of PBFs - "layer1,layer2" in URL) or via JSON styles
- Independent small vector tiles per a thematic layer - combined into a final map
- TileServer-GL implements this
- Basic overlays (markers) sometimes done independently (GeoJSON, etc.)

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## How to Style

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# CartoCSS to JSON styles

- TileMill -> MapBox Studio Classic -> MapBox Studio
- Mapnik uses CartoCSS, deprecated by MapBox (TileMill + MS Classic)
- GL styles used in JS GL + Native GL (one style everywhere: web, mobile, server)



# JSON styles

- <https://www.mapbox.com/mapbox-gl-style-spec/>
- MapBox Studio (only for MapBox hosted VT)
- Direct JSON editing as an alternative
- Hopefully an open-source visual editor in future?

# DEMO

MapBox Studio Classic  
GL JSON + MapBox Studio + MapTiler

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## How to Publish

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# Simple web hosting & cloud storage

- Simple folders with static PBF files
- <http://klokantech.github.io/mapbox-gl-js-offline-example/>
- <https://github.com/klokantech/mapbox-gl-js-offline-example>
- Amazon S3 / Google Cloud Storage
- Klokantech CloudPush (upload 12k tiles / sec)

Name	Date Modified	Size	Kind
▼ 10	6:53 PM	--	Folder
▼ 192	12:05 PM	--	Folder
401.png	12:05 PM	9 KB	Portab...image
402.png	12:05 PM	5 KB	Portab...image
▶ 193	12:05 PM	--	Folder
▶ 11	12:05 PM	--	Folder
▶ 12	12:05 PM	--	Folder
▶ 13	12:04 PM	--	Folder
▶ 14	12:04 PM	--	Folder
▶ 15	12:04 PM	--	Folder
googlemaps.html	12:04 PM	3 KB	HTML...ument
<b>index.html</b>	12:04 PM	1 KB	HTML...ument
metadata.json	12:04 PM	242 bytes	Plain...cument

# Serve PBFs from MBTiles

- TileServer-PHP
- TileServer-GL-Light (node.js)
- ...
- See USB disk (static styles, TileJSON, ...)

# Tileserver-Mapnik

- TileServer-Mapnik (powered by Tesseract)
- Easiest deploy via Docker
- <https://github.com/klokantech/tileserver-mapnik>
- Usage:
  - Copy vector tiles (.mbtiles)
  - Copy MapBox Studio Classic project (.tm2)

<http://osm2vectortiles.org/docs/serve-raster-tiles-docker/>

# Tileserver-GL

- TileServer-GL (uses MapBox GL Native)
- Easies deploy via Docker or npm
- <https://github.com/klokantech/tileserver-gl>
- Usage:
  - Copy sample data: <https://github.com/klokantech/tileserver-gl-data>
  - Adjust config, vector tiles, styles
- WIP, version 1.0 at FOSS4G 2016 in Bonn



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## How to Generate

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# MapBox Studio Classic

- Demonstrated previously
- <https://www.mapbox.com/mapbox-studio-classic/>
- Uses [mapnik-vector-tile](#) under the hood
- Command line "tilelive-copy"

# OSM2VectorTiles

- Docker-powered process
- MapBox Studio Classic (.tm2source)
- PostGIS + imposm3 + OSM planet (extracts)
- Cluster processing possible (a la MapTiler)
- Tutorial: <http://osm2vectortiles.org/docs/own-vector-tiles/>

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# Outlook and discussion

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# OSM2VectorTiles

- User community: tiles + process in use by several companies / projects already
- Improved documentation + more map styles
- Regular updates (diff process in place)
- Cooperation <http://maps.wikimedia.org/>?
- More deployments in production
- Cooperation? Use the OSM2VectorTiles for free, play & customise & improve the project!

# Contour lines, hill shading

- We have streets made from OSM...
- Vector tiles with global contour lines, hill-shading
- First tests at: <http://labs.klokantech.com/hillshading/>
- Global landuse data?

# Swiss Coordinate System

- Now possible with fixed tilegrid, but runs out of the box with all MapBox tools:
- <http://labs.klokantech.com/swissvt/>
- Customised tilegrid in future?



Vector + Raster Tiles in  
Swiss Coordinate system CH1903+ / LV95 (EPSG:2056)

# Contracts / cooperation

- Contracts: Development of map portals, mobile apps, ... delivered with source code
- Consulting: Need help from us?
- Open-source dev: OL3, OL3Cesium, GDAL, ...
- <http://www.maptiler.com/>
- References: NOAA, BBC, Vodafone, Orange, NASA, Airbus, Apple, Google, U.S. Air Force, ...





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**Thank you!**

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