



OPENSTREETMAP

VancouverGIS October 2013

www.openstreetmap.org/user/pnorman

Portions of presentation courtesy Grant Slater @firefishy1

What is OpenStreetMap

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- ❑ Crowd-sourced map of the world
- ❑ Crowd-sourced database of geodata
- ❑ A mix of local knowledge, remote sensing and 3rd party data
- ❑ An open-source project with lots of interesting technical challenges

How do I fit in?

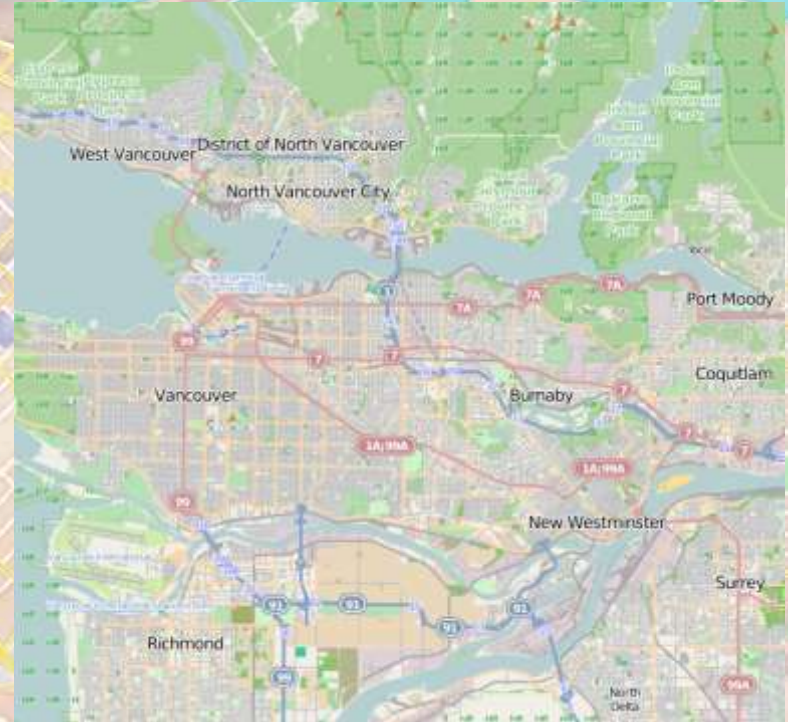
3

- ❑ Started editing in 2010
- ❑ Contributions have declined as I spend more time on technical, administrative, governance, developer relations and other tasks
- ❑ Help develop and maintain several key pieces of software

openstreetmap-carto

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- Default map rendering on openstreetmap.org
- Written in CartoCSS, a CSS like language for styling maps



Others

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- `osm2pgsql`: Most common software for converting OSM data to a rendering database
- `cgimap`: Key part of the API used to retrieve map data for editing
- `ogr2osm`: Software for converting shapefiles, KML, geodatabases, geojson, etc to .osm format

Working Groups

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- Data Working Group: Handles vandalism and editing disputes
- Licensing Working Group: Licensing matters relating to using and creating OSM geodata as well as general legal matters
- Engineering Working Group: Creating and maintaining resources to lower the barrier to starting developing for OSM or with OSM data



OpenStreetMap
The Free Wiki World Map

Search

examples: "address" "region" "street" "country" "OSM ID" or "post office" "bar" "Lodges" "more examples" "where am I?"

Help

- [Help Centre](#)
- [Documentation](#)

Community

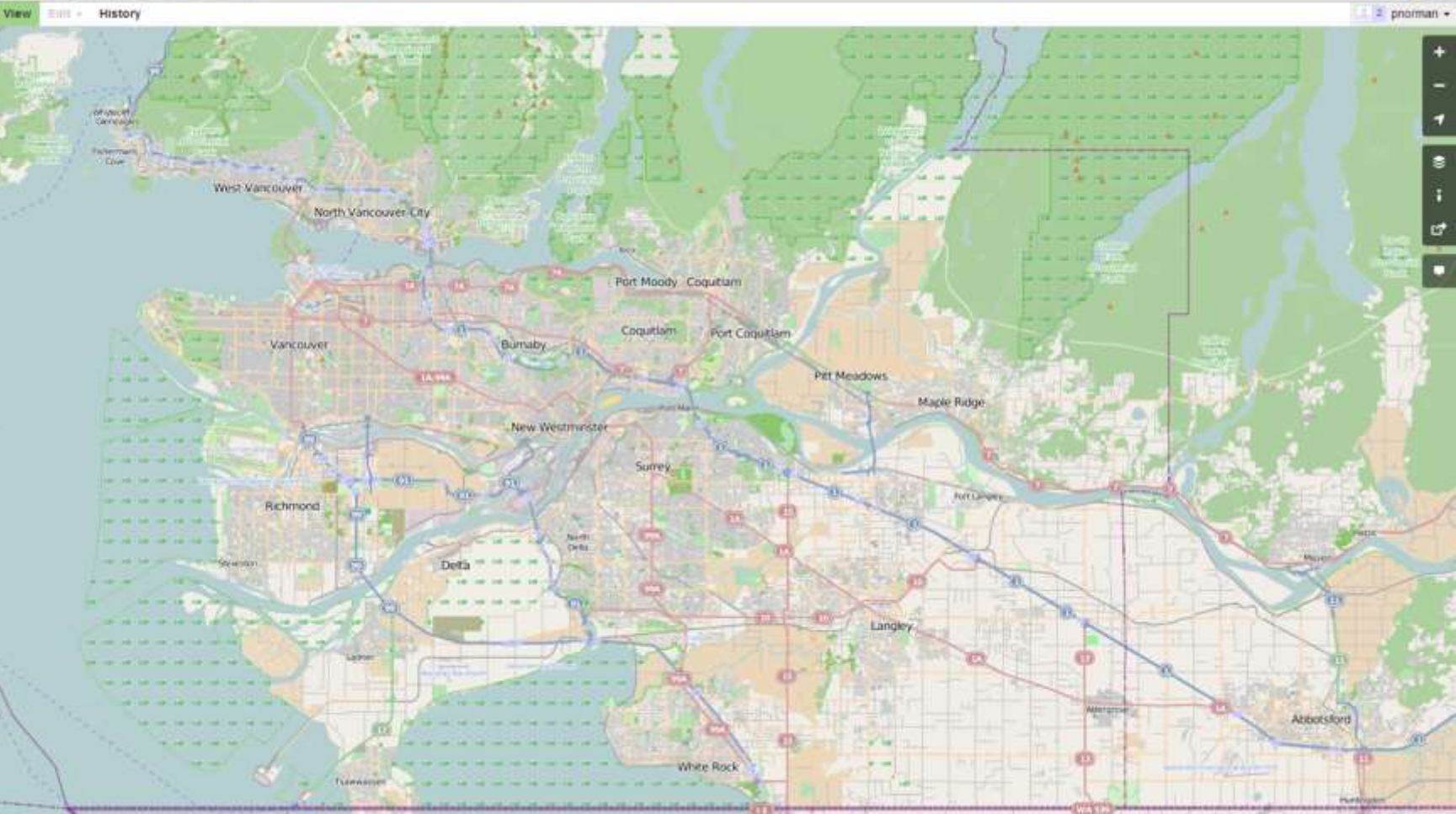
- [Community Blogs](#)
- [Foundation](#)
- [User Diaries](#)

Data

- [Copyright & License](#)
- [Export Data](#)
- [GPS Traces](#)

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3 km
2 mi



OpenStreetMap
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Search

examples: "address", "region", "street", "cemetery", "CNC S&S", "post office", "near", "Lester", "near", "examples", "where am I?"

Help

[Help Centre](#)

[Documentation](#)

Community

[Community Blogs](#)

[Foundation](#)

[User Diaries](#)

Data

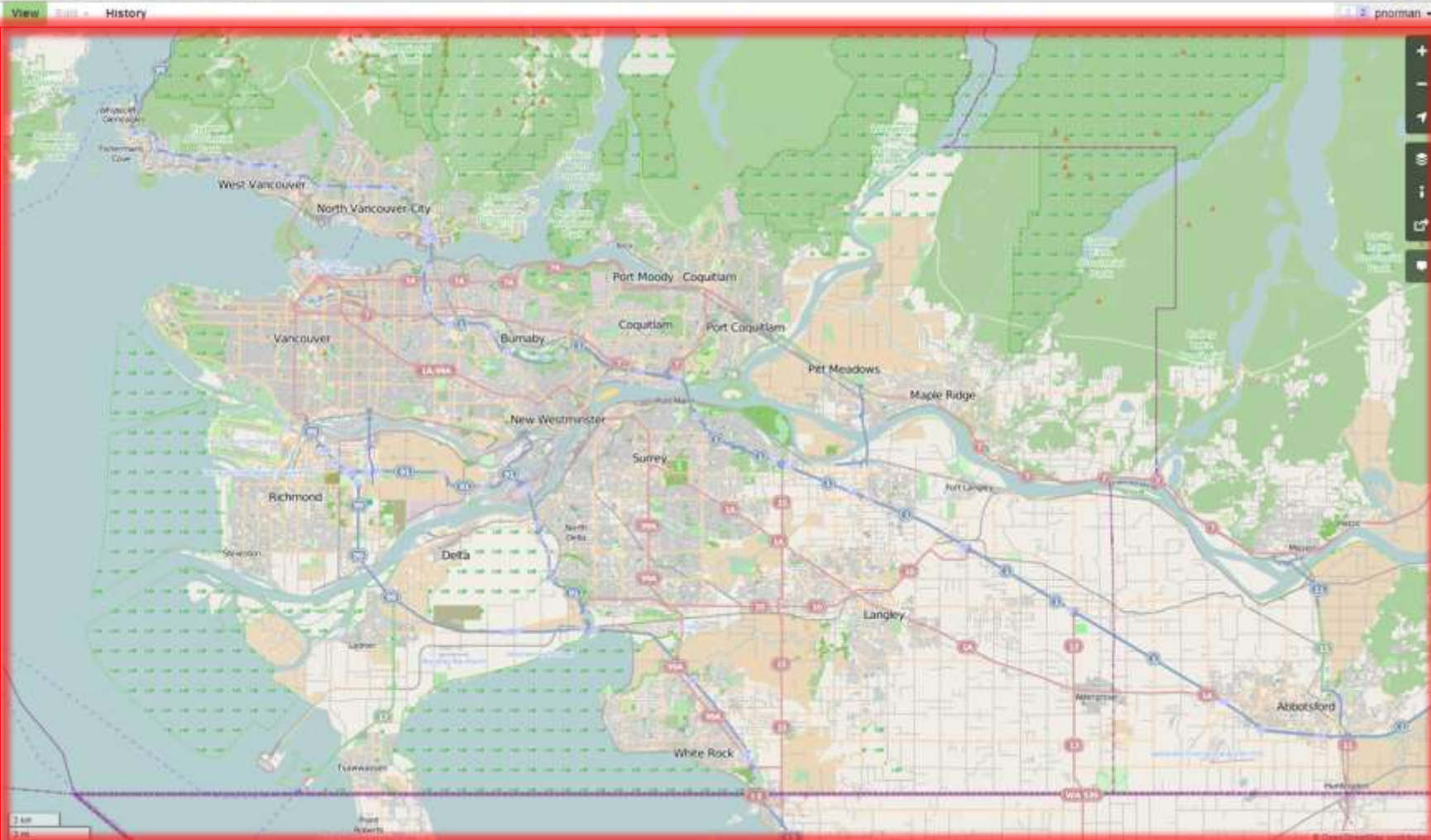
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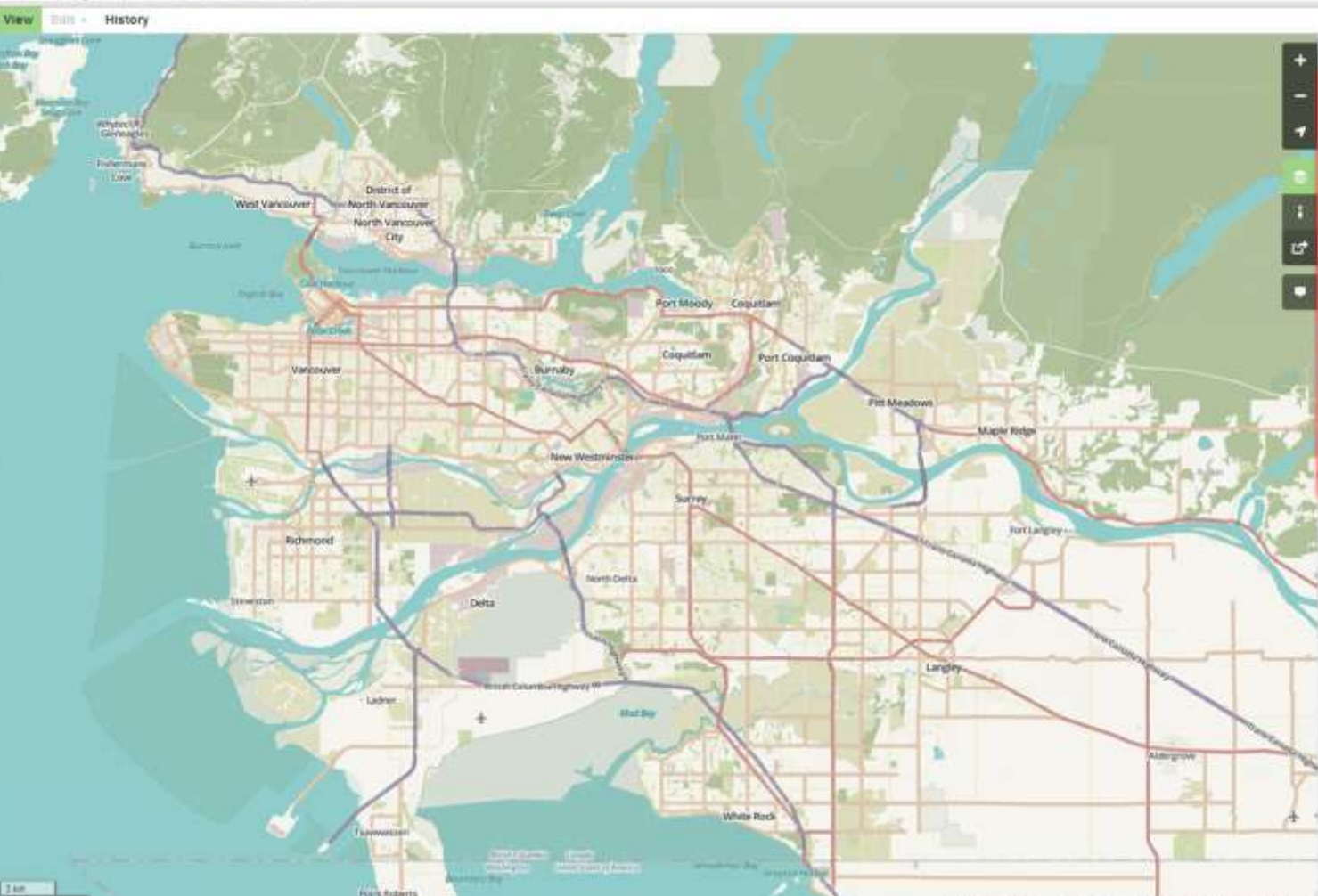
Search

examples: "address", "Royal Street, Cambridge", "CG 5432" or just an address like "London" using examples. Where am I?

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Map Layers Close

- Standard
- Cycle Map
- Transport Map
- Richmond Surrey
- MapQuest Open
- Humanitarian

Enable overlays for troubleshooting the map

- Map Notes
- Map Data

3 km
2 mi

View Edit History

Search Results Close

Results from OpenStreetMap Nominatim

Library City Center Library, West Whalley Ring Road, Whalley, Surrey, Greater Vancouver Regional District, British Columbia, Canada [View details](#)

[More results](#)

Results from GeoNames

No results found



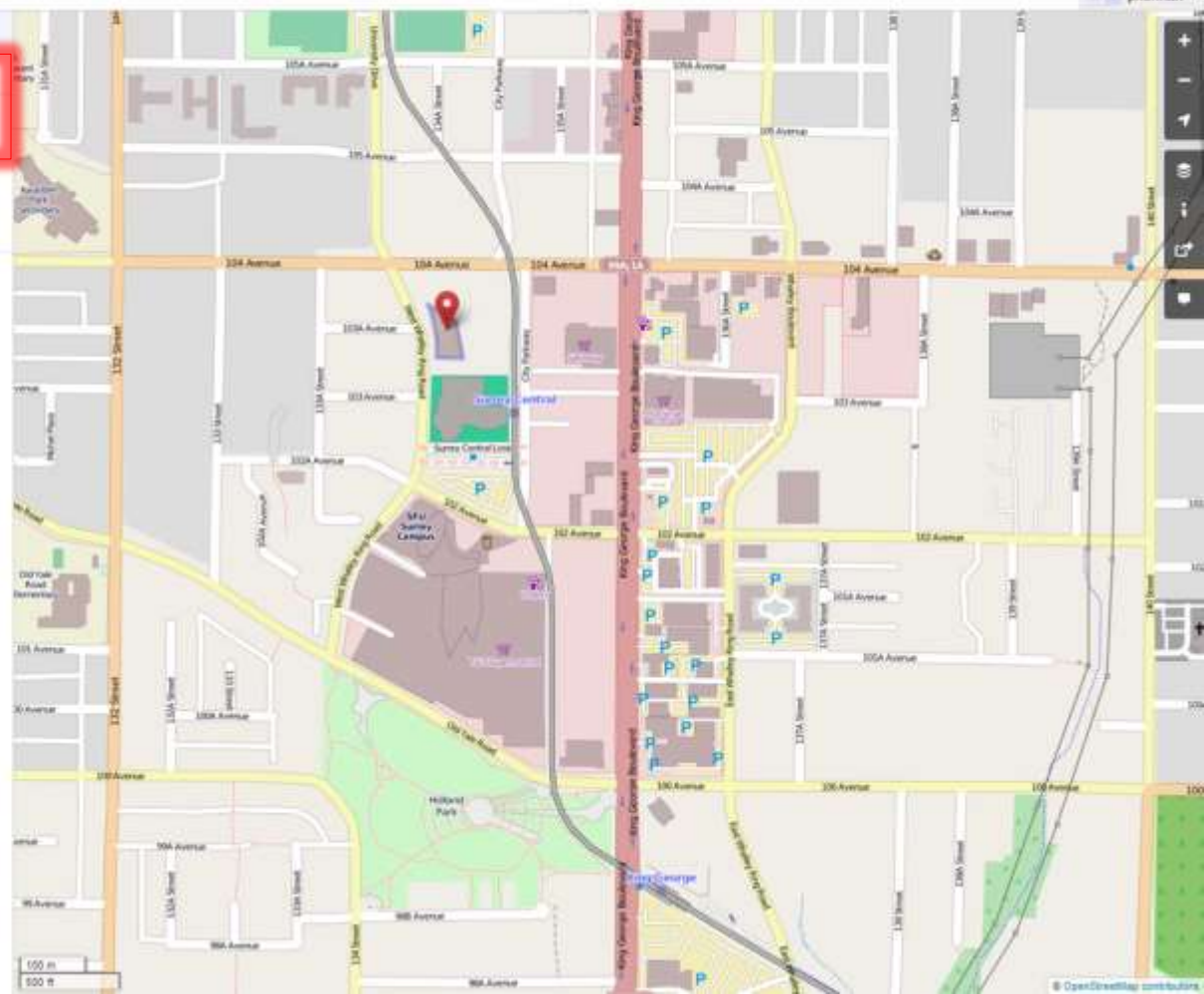
City Center Library, Seattle

coordinates, address, routing, street, contributor, OSM ID, or just address (see Library page examples) - Where you?

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OpenStreetMap
The Free Wiki World Map

Search

examples: "address", "region", "street", "country", "OSM ID", "land office", "near", "Länder", "near", "examples", "where am I?"

Help

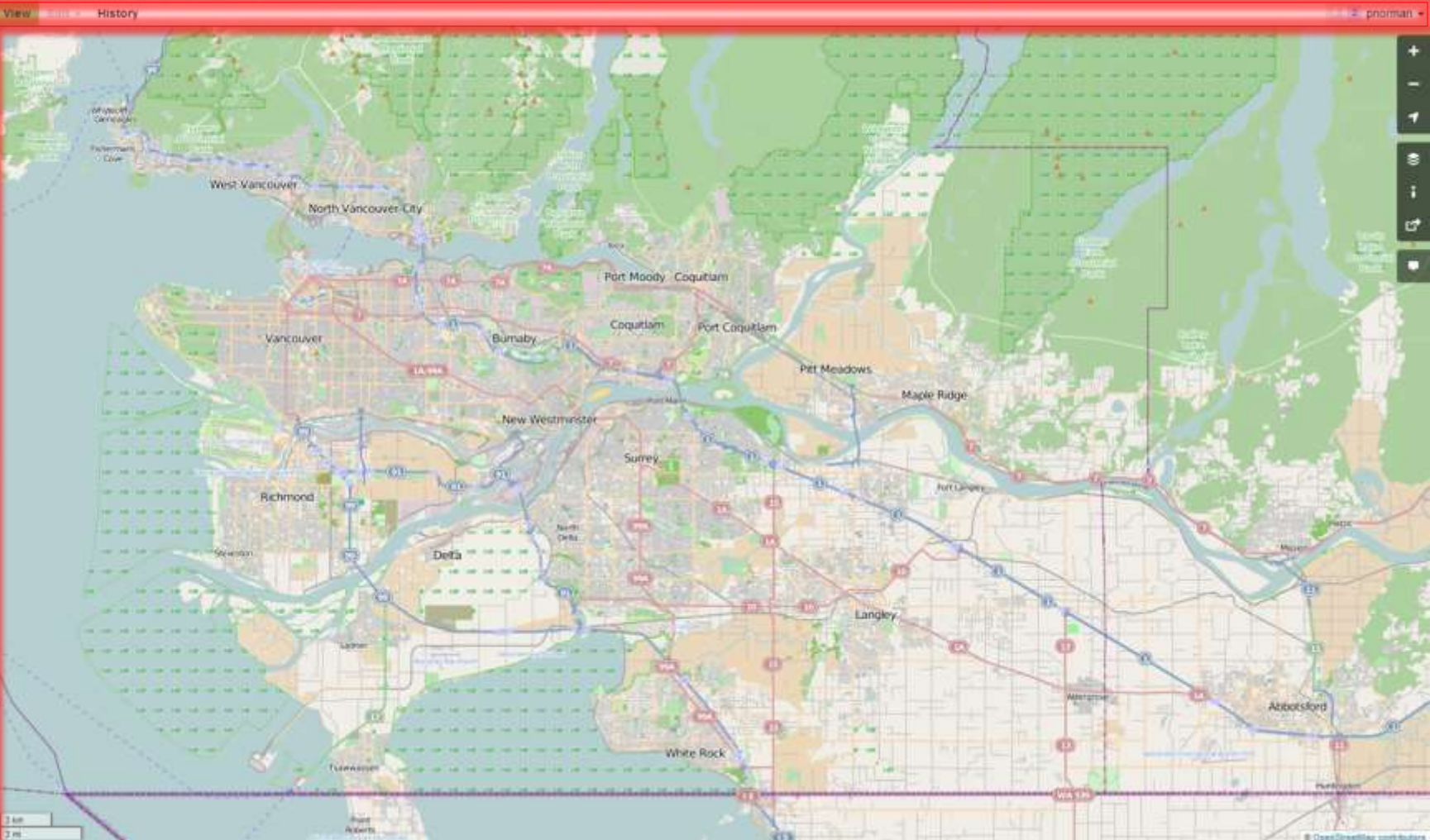
- [Help Centre](#)
- [Documentation](#)
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Data

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Routing is supported by the OSM, Via Carota, Imperial College, LON and Bytemark routing, and other partners.



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pre-SOTM drinks + Victoria + Cheshire cheese

Posted by [Harry Wood](#) on 5 October 2013 in [English \(English\)](#)

We've had a few OpenStreetMap events lately which I didn't report back on yet. The big one of course, State of the map, up in Birmingham. I'll come back to that, but also quite a few London events ([The next London event is this coming Thursday](#))

There were the **pre-SOTM drinks with the MapBox guys**. Strongroom bar was less annoyingly crowded than I remembered it, so that was good. I shall have to go back there (pretty close to my office) Having said that, we did have quite a crowd made up of OSMers getting together before the conference, and some other Shoreditch start-up tech community type folks.



There was a couple of guys who had printed OSM maps onto [little cards](#) as a conceptual experiment in sharing city information with friends. Interesting idea I thought. Can't find it online though. Mysterious. At this meet-up I full of the usual pre-SOTM excitement, plus I was excited at having just taken delivery of loads [polo shirts](#).

An earlier OSM London event was our meet-up and [mapping session in Victoria](#). I've avoided the Victoria area for



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View Edit History

Changeset: 18103640

[Changeset XML](#) | [osmChange XML](#)

18103639 | 18103641 | **pyroshroom** | 18103687

Created at:	Mon, 30 Sep 2013 04:11:17 AM UTC
Closed at:	Mon, 30 Sep 2013 04:11:18 AM UTC
Belongs to:	pyroshroom
Tags:	<code>comment = Added Sushi Zero One</code> <code>created_by = id 1.2.0</code> <code>imagery_used = Bing</code>
Bounding box:	49 2837761 -123 1132218 (box) -123 1132218 49 2837761

Has the following 1 node: **ii** [Sushi Zero One \(2477251661, v1\)](#)

page 1 (1 of 1)



[View area on larger map](#) | [Edit area](#)

Edit feature

Laundry

Name
Tidy-Poo Can Laundry

Address

House name

123 Street

City Postal code

Hours

URL/website

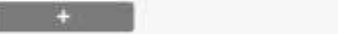
Phone

+1 604 526 4299

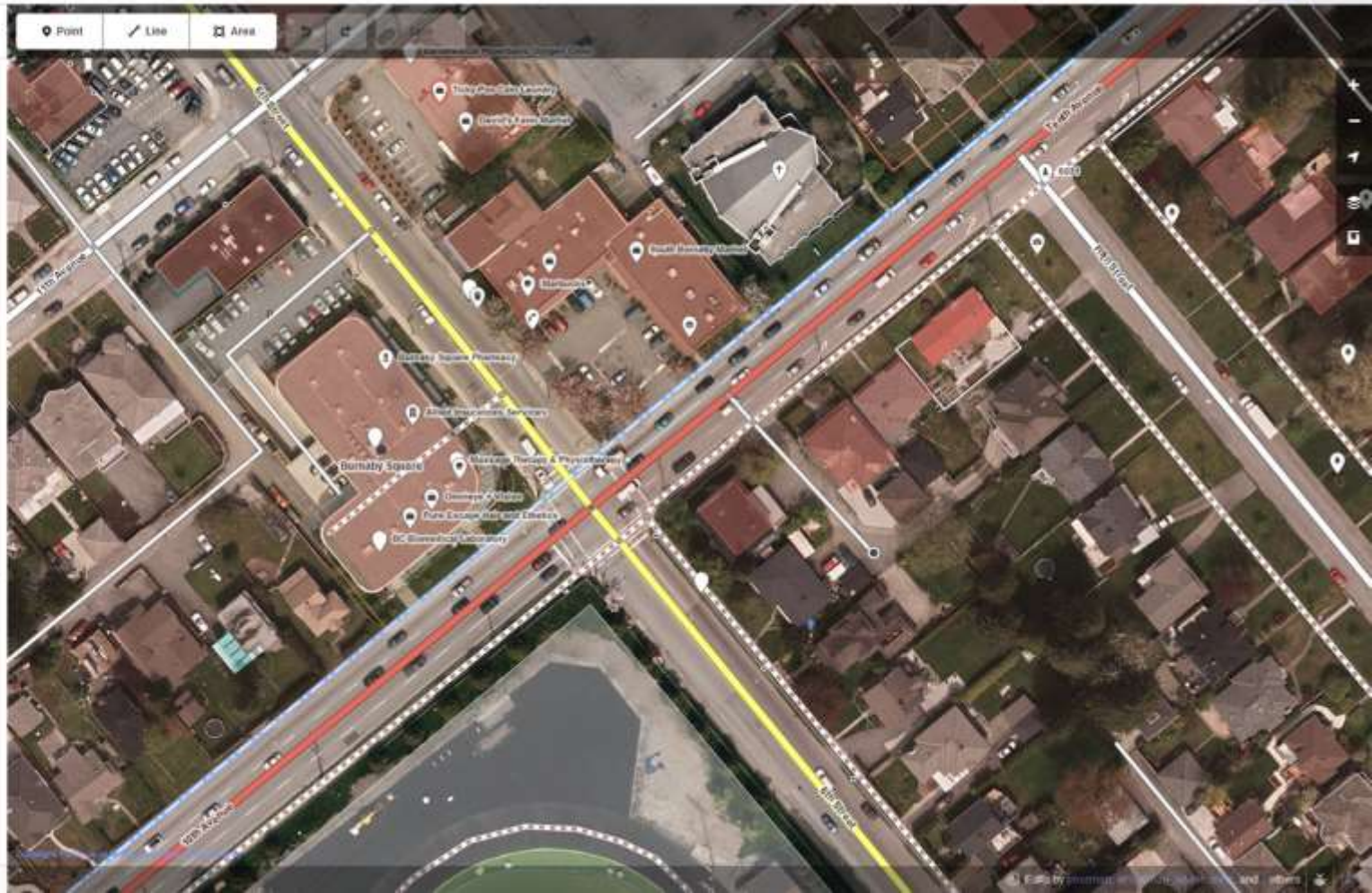


All tags (2)

All relations (0)



Point Line Area



View Edit History



OpenStreetMap
The Free Wiki World Map

Search
autocomplete: "address", "region", "street", "country", "OSM SAID" or "post office near London" here examples... (show more)

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Laundrette

★ Basic Details Address

Name: Ticky-Poo Coin Laundry

Search

Advanced



Click, hold and drag to move. Backspace/delete to delete.



Layers

- Data Layer 1
 - British Columbia Music

Properties: 3 / Members: 0

Shops/Clothes/Laundry ...

Annotation/Contact (common schema) ...

Key	Value
name	Toby-Poo Com Laundry
phone	+1 604 526 4299
shop	laundry

+ Add Edit Delete

Set: Ref: 0 / Ways: 0 / Nodes: 1

Toby-Poo Com Laundry [49.2297457, -122.9286670] [id: 1,000]

49.2297457 -122.9286670

(no object) Move objects by dragging (Shift to add to selection (Ctrl to toggle), Shift-Ctrl to rotate selected; Alt-Ctrl to scale selected); or change selection

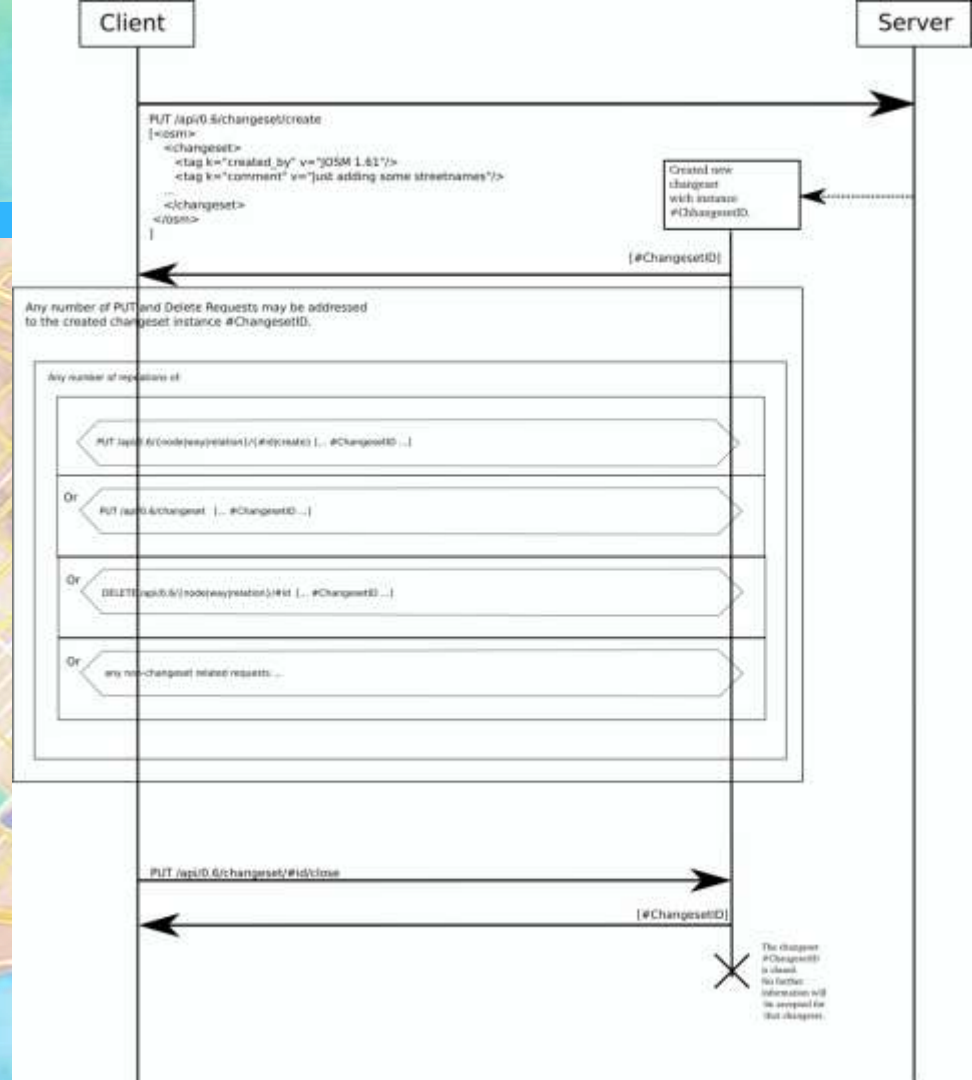
Editing workflow

- A user downloads an area in an editor from the API
- API responds with XML representation of vector data for the area
- User edits locally
- Editor could be a mobile app, desktop app, web-based app, or other
- Working on standardizing a JSON representation for the core API

Editing workflow

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- User hits upload in their editor
- Editor sends changes to server
- Editor gets applied changes back



Editing workflow

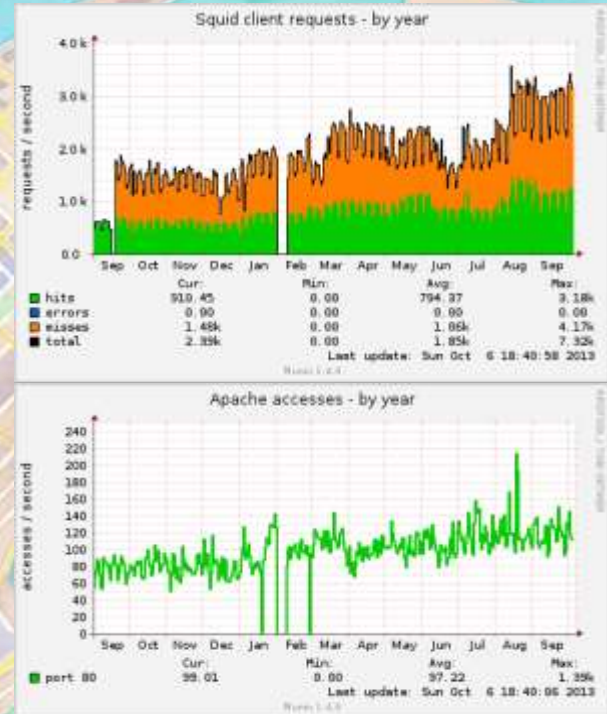
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- ❑ Server creates files that can be used to update local copies of data
- ❑ Rendering servers download these changes and render data
- ❑ User hits reload on the webpage (sometimes twice) and sees changes
- ❑ About 60 seconds between hitting upload and seeing changes

A technical challenge: Load

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- >1,300,000 signed up users
- 3000 mappers a day
- 4.4 million unique visitors per month (osm.org)
- 3.5 TB Postgresql Database
- High IOPS: Concurrent Read + Write
- tile.openstreetmap.org (rendered map)
 - Live Map updates (Minute rendering)
 - Average of 2800 tiles per second. (5500 tiles per second peak)
 - Average: 195Mbits/s out (65 TB/month, 440Mbit/s peak)



A technical challenge: Constraints

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- Older hardware
 - Many HP DL360 G5 servers; their CPU line was released in 2007
 - Rendering servers using 3 year old hardware
 - Limited budget (donate.openstreetmap.org)
 - Some components upgraded
- A small volunteer team
 - 3 OSM sysadmins
 - 4 local sysadmins for particular machines

Excellent uptime

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- >99.7% API uptime
- >99.95% planet (data dump) uptime
- >99.9% tile uptime, including outages that only affected on country and a migration to a new server
- >99.9% geocoder uptime
- Uptimes are over the last year and **include** scheduled outages and upstream network failures

Core services: Primary

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- www.openstreetmap.org
- api.openstreetmap.org
 - Editing API
- planet.openstreetmap.org
 - Raw OSM data exports: weekly, daily, minutely, and streaming

Core Services: Secondary

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- ❑ tile.openstreetmap.org
 - ▣ Hundreds of other tile servers out there offering their own renderings of OpenStreetMap data
- ❑ nominatim.openstreetmap.org
 - ▣ MapQuest runs a nominatim instance too
- ❑ wiki.openstreetmap.org
 - ▣ Project documentation

Services: Tertiary

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□ Run by us

- help.osm.org (Q&A "stackoverflow")
- blog.osm.org
- wiki.osmfoundation.org
- otrs.osm.org (support tickets)
- piwik.osm.org (site visitor analytics)
- munin.osm.org (monitoring)
- lists.osm.org
- svn.osm.org
- git.osm.org
- trac.osm.org
- irc.osm.org
- dev.osm.org (aka toolserver)
- switch2osm.org
- [imagery](https://imagery.osm.org)

□ Run by others

- taginfo.osm.org
- forum.osm.org
- ci.osm.org (Continuous Integration)

Servers!

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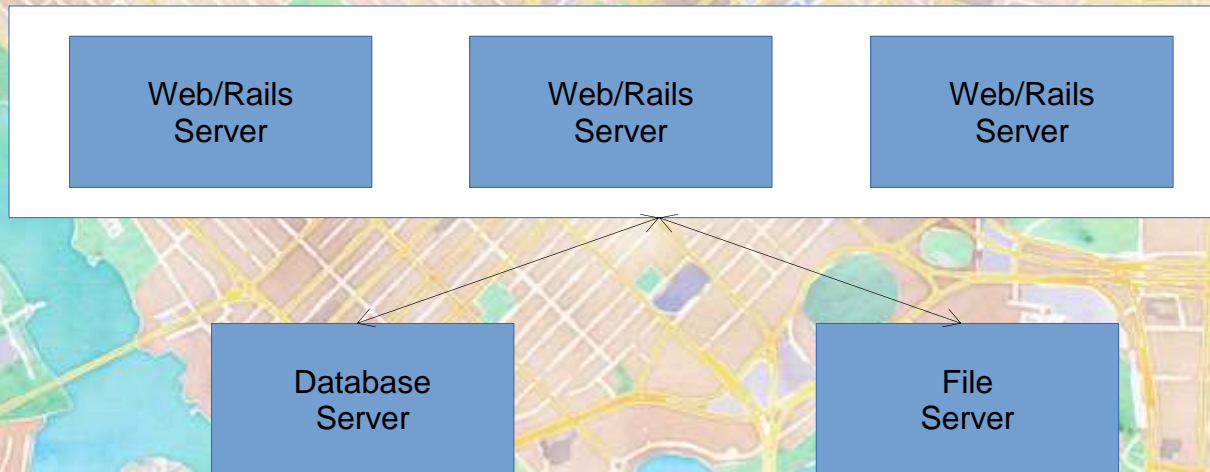
- Here be Dragons
 - bunyip draco errol eustace faffy fume gorynych horntail idris ironbelly jakelong katla lurien nadder-01 nadder-02 nepomuk noquiklos norbert orm ouroboros poldi ramoth ridgeback ridley sarel shenron smaug spike-01 spike-02 spike-03 tabaluga thorn-01 thorn-02 thorn-03 trogdor urmel yevaud zark
- Total: 38
- Standardizing hardware (in progress)
 - HP Proliant
 - Supermicro Superserver



osm.org (www)

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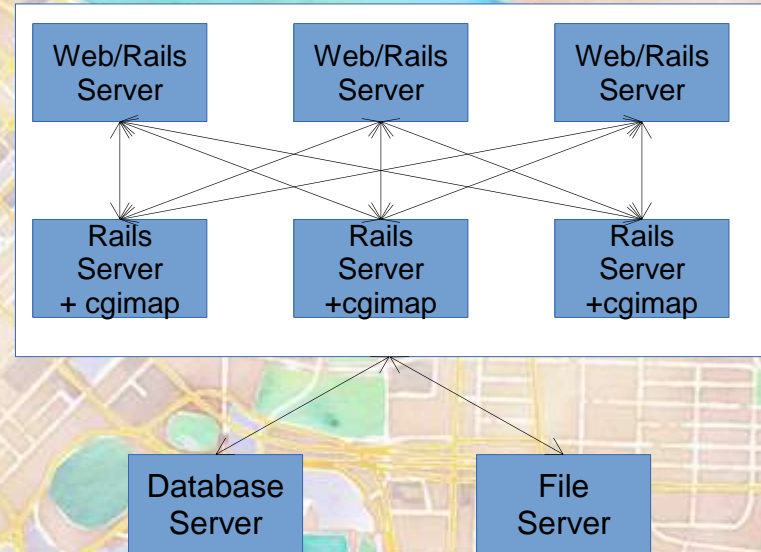
- Ruby on rails
- <https://github.com/openstreetmap/openstreetmap-website>



osm.org (www+api)

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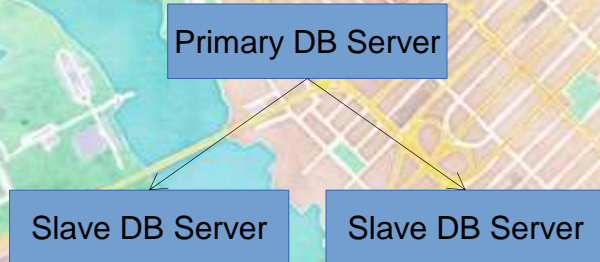
- Cgimap
- <http://github.com/zerebubuth/openstreetmap-cgimap>



osm.org database

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- PostgreSQL 9.1
- Streaming replication to 1-2 read servers
- 3.5TB of data



Data export

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- Raw OSM XML or binary format data
- <http://planet.osm.org/>
 - ▣ Streaming diffs
 - ▣ Minutely diffs
 - ▣ Daily diffs
 - ▣ Weekly dumps – 370GB uncompressed

Tile Rendering

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- 2 live rendering servers
- PostGIS (osm2pgsql)
- mod_tile
 - ▣ Apache module
 - ▣ http://github.com/openstreetmap/mod_tile
- Map stylesheet
 - ▣ <http://github.com/gravitystorm/openstreetmap-carto>



Tile CDN

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- 11 caching servers around the world
 - <http://dns.openstreetmap.org/tile.openstreetmap.org.html>
- Automatically load balancing
- Rebalances in case of server failures



Nominatim (Search)

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- “Unholy SQL magic”
 - <http://wiki.osm.org/Nominatim>

Bakar Fitness Center

Name:
Bakar Fitness Center (name)
Type: place:house
Last Updated: 2013-03-08 14:41
Admin Level: 15
Rank: Other: 30
Coverage: Point
Centre Point: 37.767814, -122.393360
OSM node [56628640](#)

Extra Tags:
Bakar Fitness Center (description): mall (sport)

Address

Bakar Fitness Center (Type: place:house, 0 [GOTO](#))
1673 (Type: place:house_number, 0 [GOTO](#))
Owers Street (Type: highway:unclassified, way [82486533](#), 15, 0 [GOTO](#))
Mission Bay (Type: place:neighbourhood, node [208468208](#), 15, 0.00426643815143661 [GOTO](#))
San Francisco (Type: boundary:administrative, relation [111866](#), 0, 0.299270828643056 [GOTO](#))
[San Francisco](#) (Type: place:city, node [11084780](#), 15, 0.0664476790205609 [GOTO](#))
[California](#) (Type: boundary:administrative, relation [106478](#), 4, 2.70114761034943 [GOTO](#))
[United States of America](#) (Type: boundary:administrative, relation [148838](#), 2, 11.8665283454879 [GOTO](#))



Future Plans

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- API in JSON
- Routing (osm.org + debugging)
- Additional horizontal scaling of API reads
- Additional tile caching in Americas + Asia
- Scaling with growth curve
 - >40% year on year

Monitoring

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- Proactive
 - <http://munin.osm.org> with alerts to sysadmin team
 - Long-term planning and growth
- Reactive
 - Pingdom (sms + email alerts)

Contact / Credits

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- Paul Norman: penorman@mac.com
- 604-779-2432
- osm.org/user/pnorman
- Background by Stamen Design, CC BY 3.0, contains information from OpenStreetMap, ODbL 1.0
- <http://donate.osm.org/>