What is OpenStreetMap

- 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?

- 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

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

- `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

- 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
pre-SOTM drinks + Victoria + Cheshire cheese

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 OSMLondon event was our meet-up and mapping session in Victoria. I've avoided the Victoria area for...
## Changeset: 18103640

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| Closed at      | Mon, 30 Sep 2013 04:11:18 AM UTC  |
| Belongs to     | pyroshroom               |
| Tags:          | comment = Added Sushi Zero One  |
|                | created_by = ID 1.2.0     |
|                | imagery_used = Bing       |

**Bounding box:**

-123.1132218, 49.2837761

**Has the following 1 node:**

- Sushi Zero One (2477251661, v1)
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

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

- 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

- >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

- 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

- >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

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

- 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

- 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

- Run by others
  - taginfo.osm.org
  - forum.osm.org
  - ci.osm.org (Continuous Integration)
Servers!

- 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)

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

Diagram:
- Web/Rails Server
- Web/Rails Server
- Web/Rails Server
- Database Server
- File Server
osm.org (www+api)

- Cgimap
- http://github.com/zerebubuth/openstreetmap-cgimap
osm.org database

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

- Raw OSM XML or binary format data
  - Streaming diffs
  - Minutely diffs
  - Daily diffs
  - Weekly dumps – 370GB uncompressed
Tile Rendering

- 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

- 11 caching servers around the world
- Automatically load balancing
- Rebalances in case of server failures
“Unholy SQL magic”

http://wiki.osm.org/Nominatim
Future Plans

- 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

- **Proactive**
  - [http://munin.osm.org](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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- 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/