An Introduction to OpenStreetMap

Mele Sax-Barnett

October 19, 2013

OpenStreetWhat?

- http://www.osm.org
- OpenStreetMap or OSM
- ***Not*** "Open Street Maps"
- Founded in 2004
- Worldwide and seamless
- "Wikipedia of Maps"
  - Editable by anyone with an account

So, what is it really?

- It's a very large database of XML data
- Each feature is of a certain basic type, and is defined by tags (key value pairs)
- Basic types:
  - Nodes (points)
  - Ways (lines)
  - Areas (polygons)
  - Relations (groups)
- Example tags:
  - highway = primary, bridge = yes

What is it *not*?

- A rendered map that uses particular cartography, whether for web or paper.
- Proprietary—anyone can use it for free as long as they provide proper credit
- Something static—it changes and grows all the time
- Controlled by an authority—it is driven and maintained by a large community of contributors and data consumers

Who uses OpenStreetMap?

- http://switch2osm.org

(you)

What kind of things can you find in OpenStreetMap?

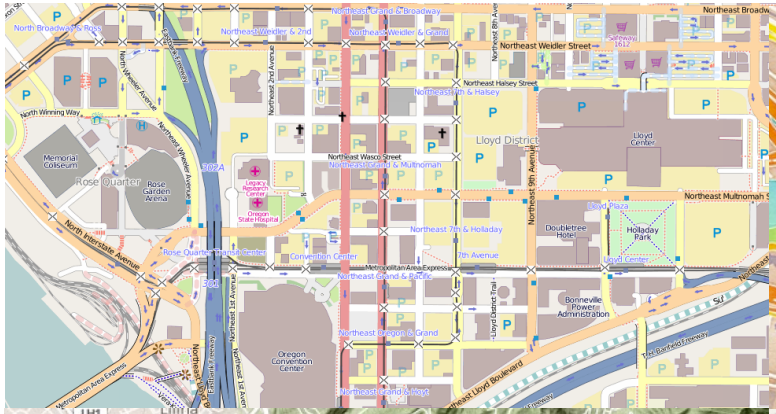
- Roads, highways, bridges, and tunnels
- Bus stops, bus routes, bike routes, and railways
- Businesses: shops, restaurants, bars
- Buildings: schools, churches, houses
- Parks, lakes, mountains, and even trees
- Airports, power networks, and mailboxes
- Administrative boundaries
- Almost anything that stays the same for a while, see http://wiki.osm.org for more

How did all this data get there?

- United States: 2007 TIGER data import http://wiki.openstreetmap.org/wiki/TIGER
- Other imports of open data
- Around the world: lots of people uploading and tidying up GPS tracks
- More recently, tracing aerial imagery (Bing gave special permission for editors to use its aerials)
- Local knowledge
- *A real person put it there, and other people have looked at it and confirmed that it is correct*
- **Challenge: data maintenance**

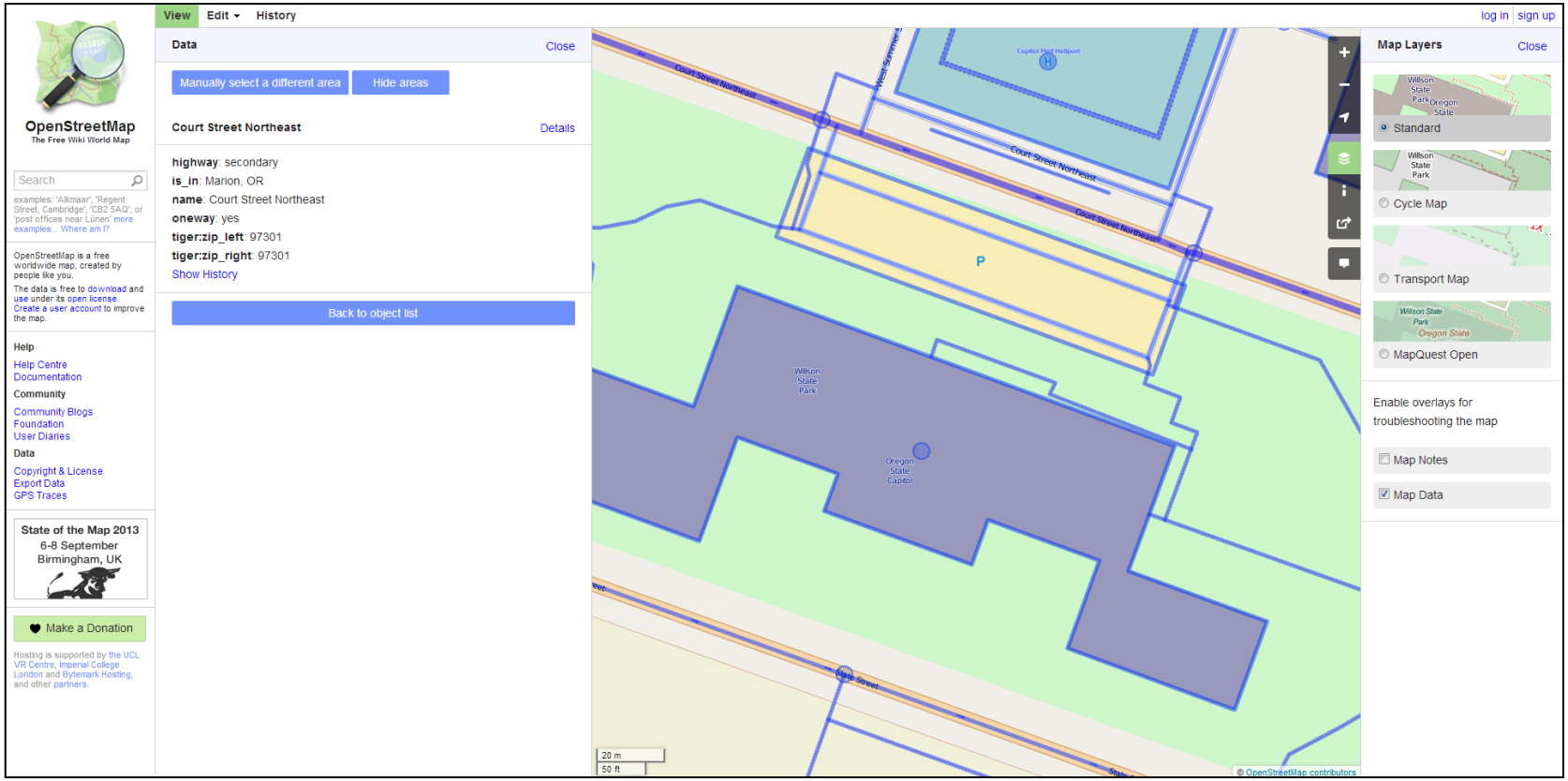
What does it look like?

OSM.org default

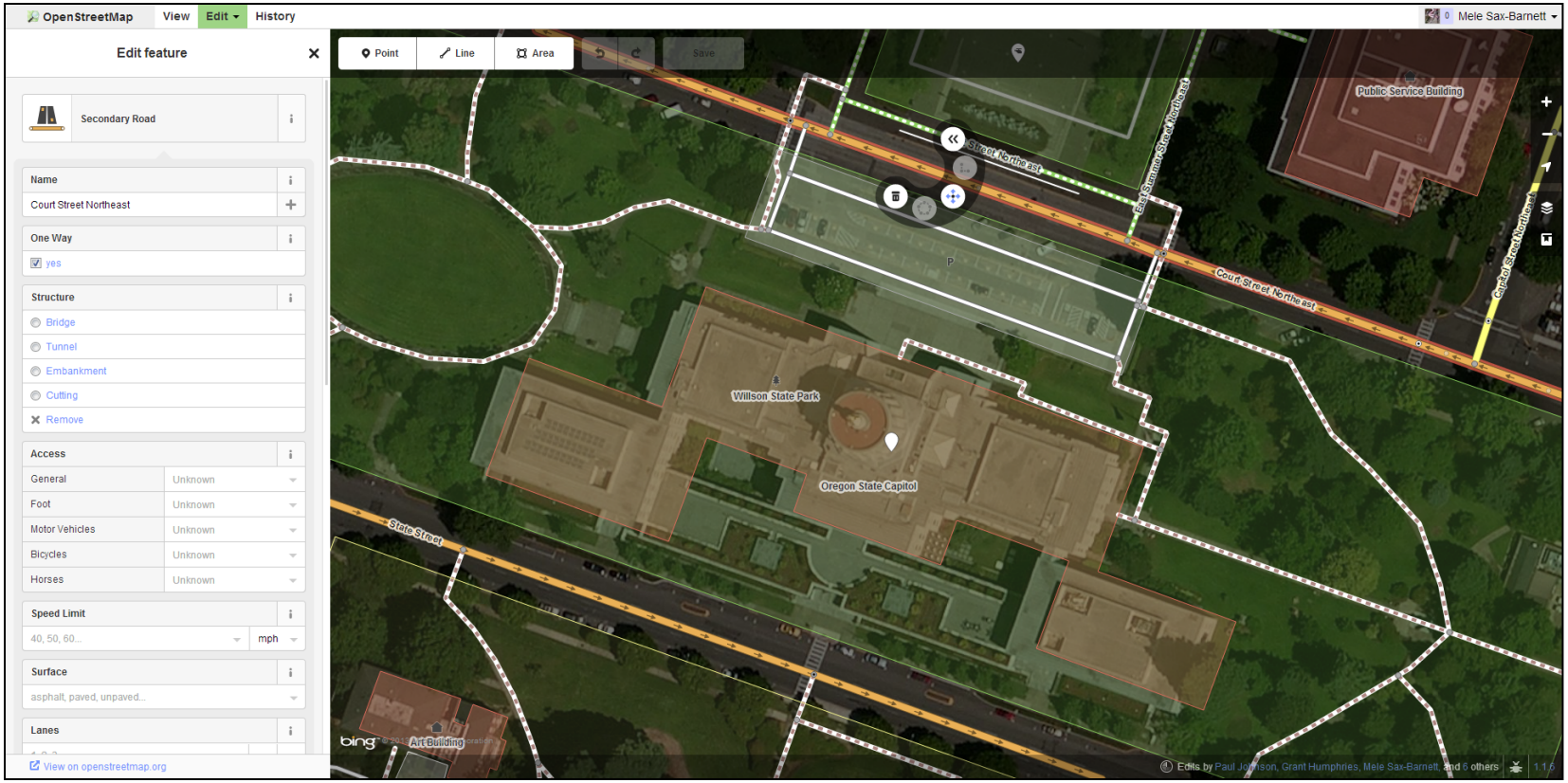


Stamen Design

What does it look like?



What does it look like?



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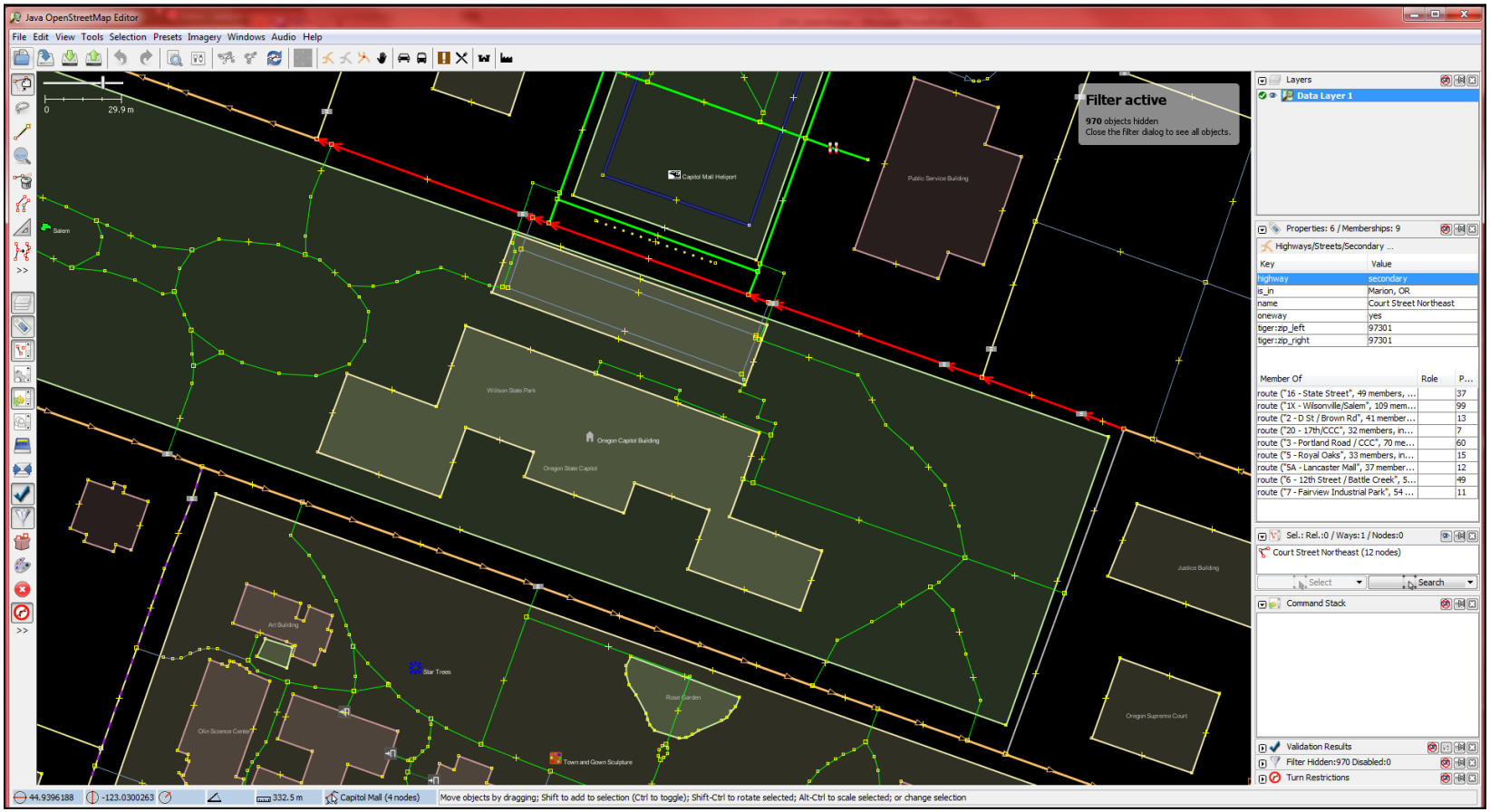
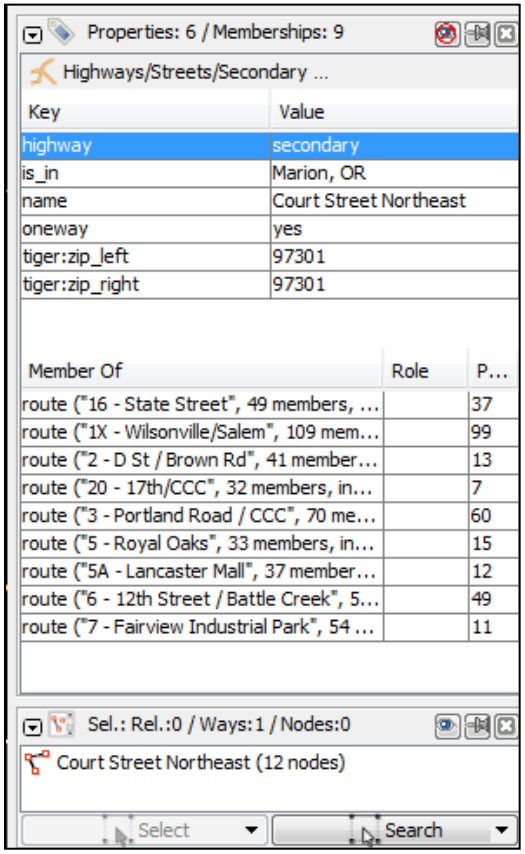
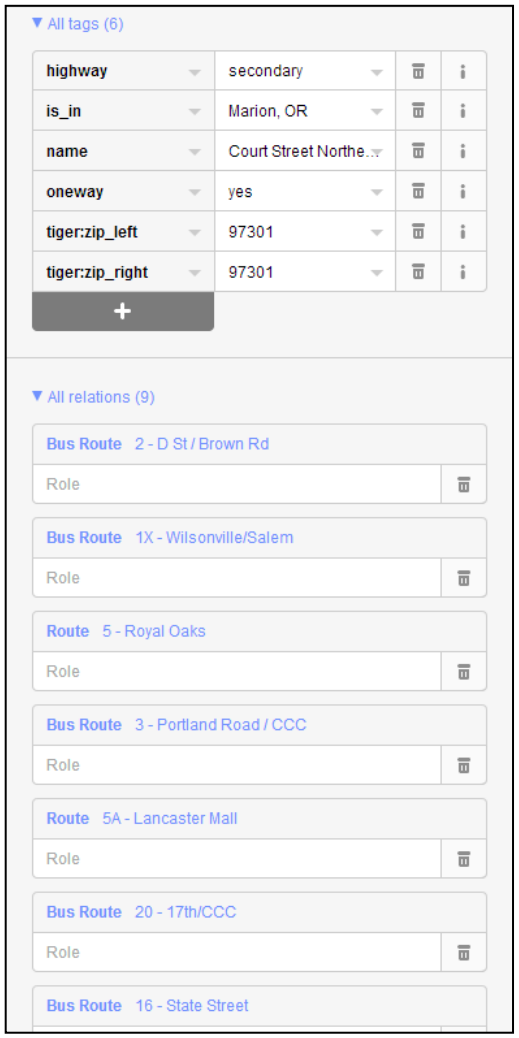


OSM data



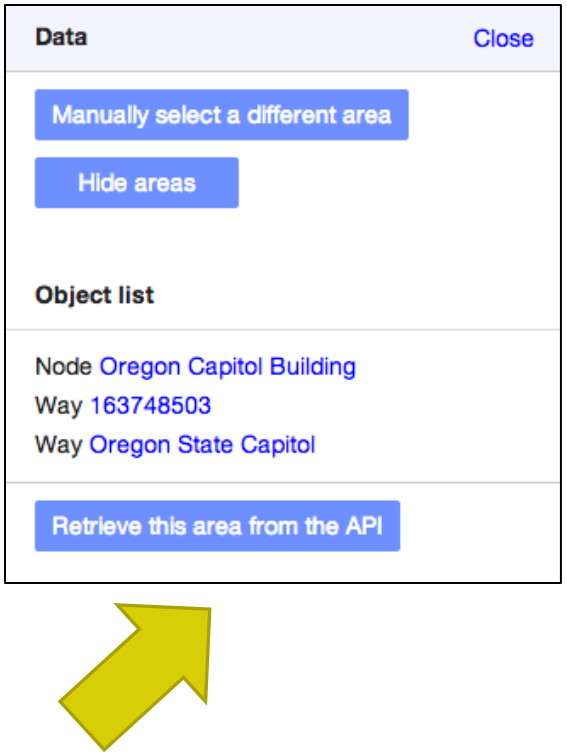
JOSM

iD

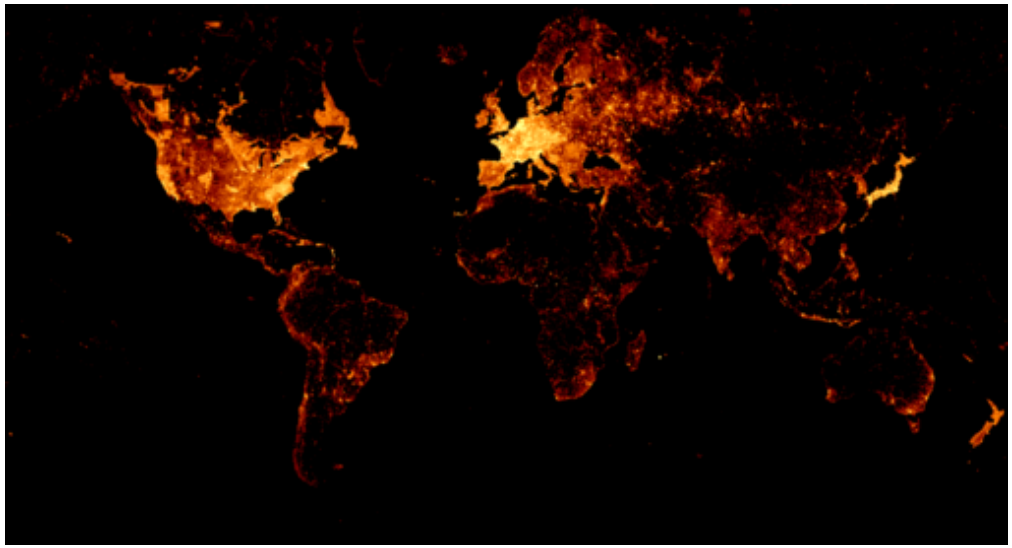


How do you get the data?

- http://wiki.openstreetmap.org/wiki/Downloading_data
- Download via OSM editors and GIS software OSM plugins
- Large extracts are hosted around the web, updated at differing schedules
- You can also now download directly from http://osm.org in the data view



Taking the next step: Editing OpenStreetMap

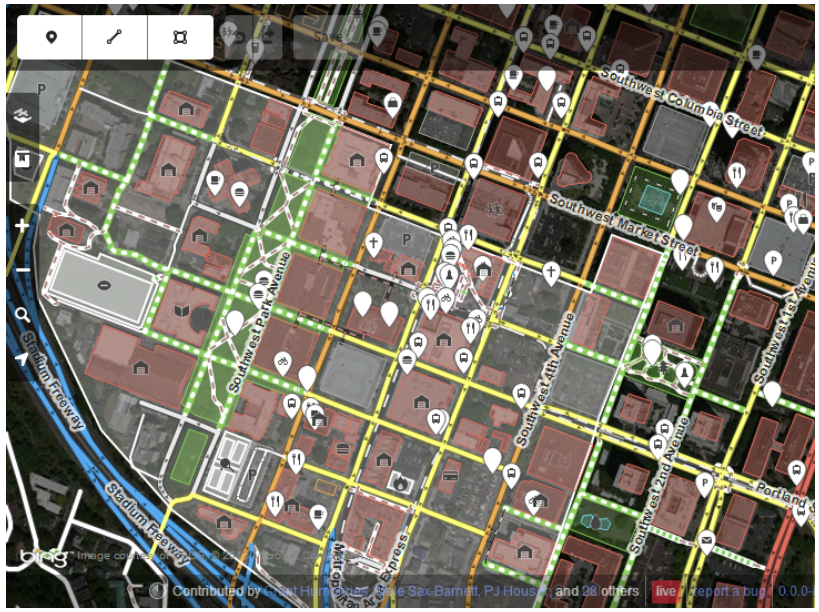


http://www.openstreetmap.org/user/tyr_asd/diary/19549

How do you edit OSM?

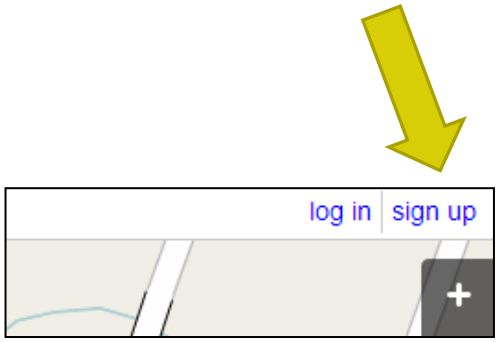
1. Sign up for an account
2. Choose one of several free and open source editors
   - iD and JOSM are popular
   - Examples here will be using iD, a new in-browser editor

iD JOSM

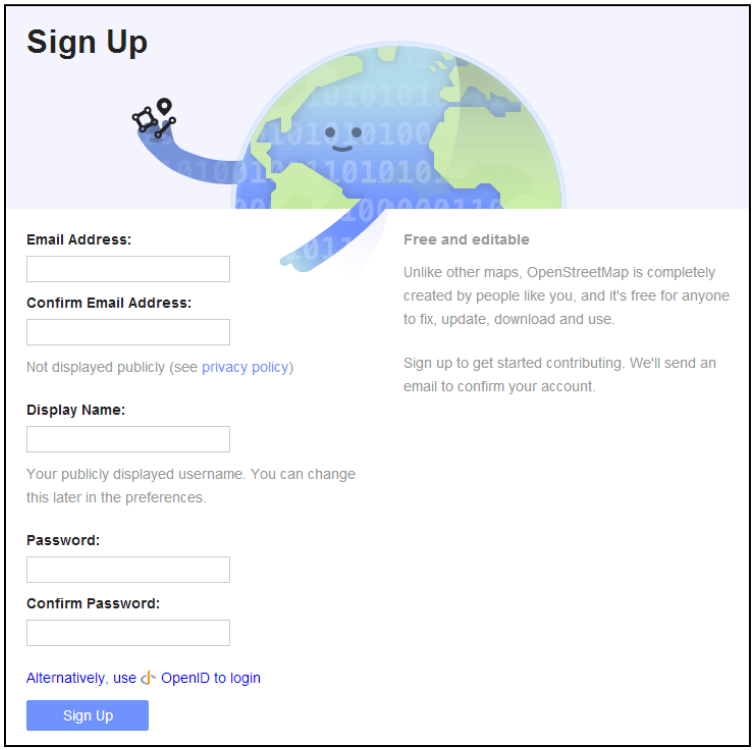


Step 1: Sign up for an account

- Go to http://osm.org
- Click the "sign up" link in the top right corner



- Set up your account!



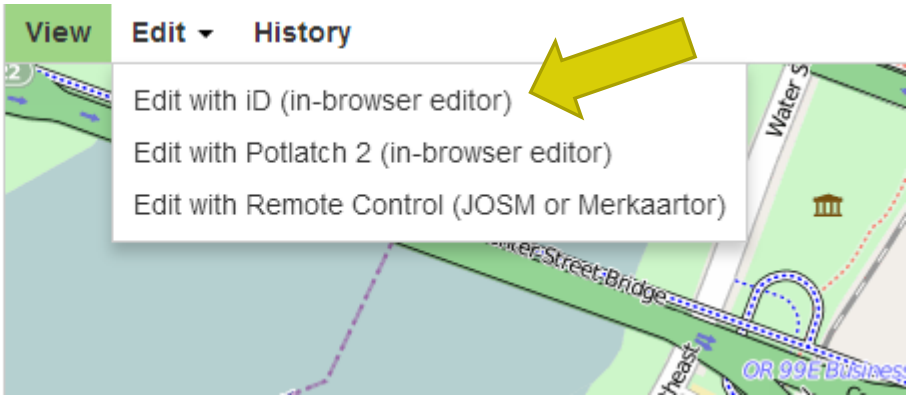
Step 2: Where and what

- Congratulations! You are now the owner of one of > 1 million OSM editing accounts!
- Go to http://osm.org
- Find a neighborhood that you know well
- Think about the places that you know about there - ***local knowledge***
- Notice anything missing?

Step 3: Getting started with iD

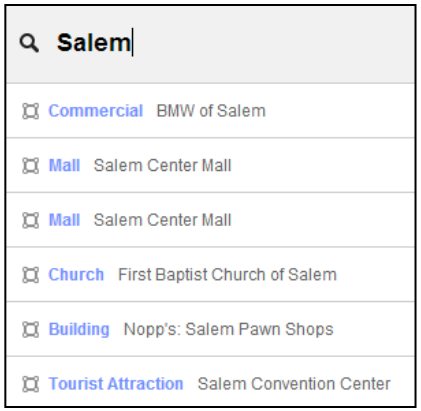
- Start familiarizing yourself with iD:
  - Select Edit -> Edit with iD
  - Go through the walkthrough

Start the Walkthrough



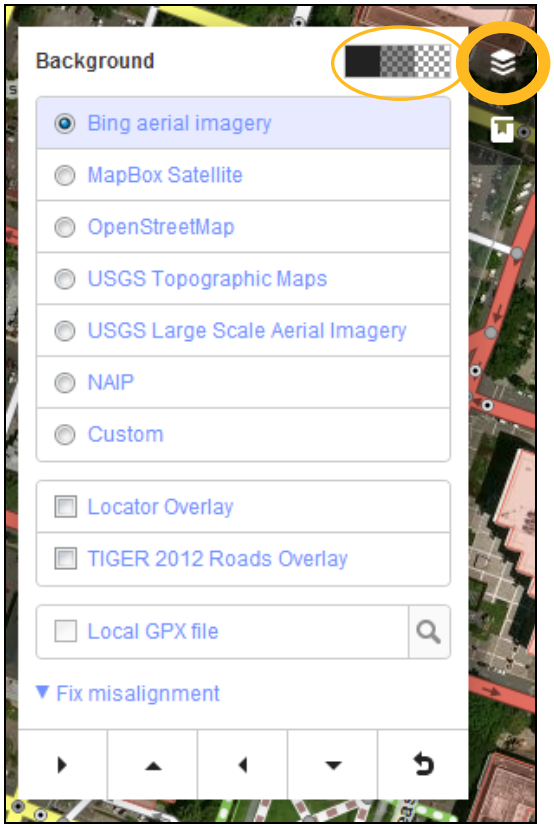
Step 3: Getting started with iD

- After the walkthrough:
  - Click things to see how they're classified
  - Don't worry, you can't break anything ***until you click "Save"***
  - Click the magnifying glass to search for a city or place
  - Or, click the arrow to find your current location



Step 3: Getting started with iD

- Changing the background imagery
  - Adjust brightness
  - Lots of imagery choices
  - TIGER data overlay
  - Custom/local files and imagery
  - Adjust alignment



Step 4: Change something

- But first, what's your source?
- **Don't copy from other maps**
- Local knowledge is best, but a dataset with the correct license and permissions can be a source
- You even need permission for aerial imagery (imagery included in OSM editors is OK)
- More info about the OpenStreetMap license (OdBL) can be found at http://www.openstreetmap.org/copyright

Step 4: Change something

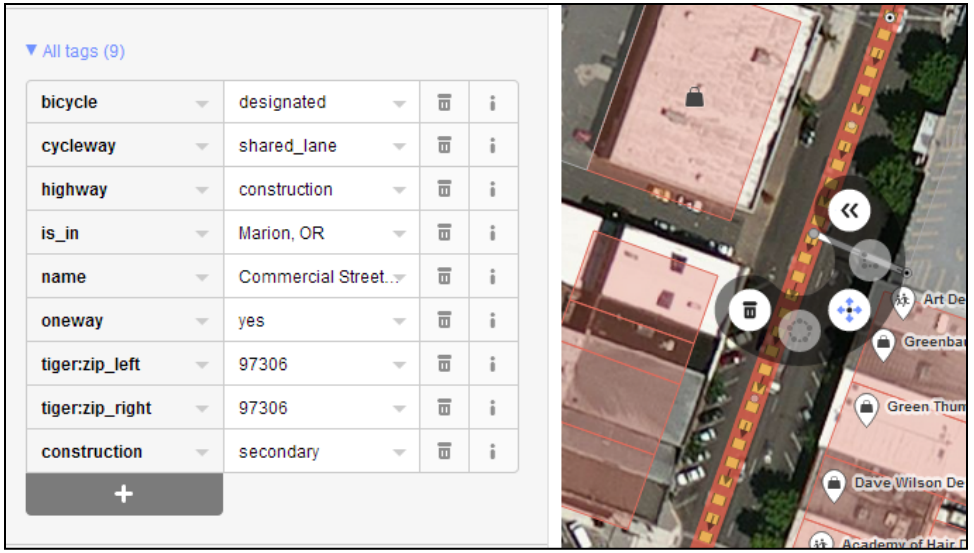
- Let's say a road will be closed for construction for a long period of time
- Select it, click the triangle to show all tags

Change from

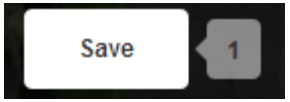
`highway=secondary`

to

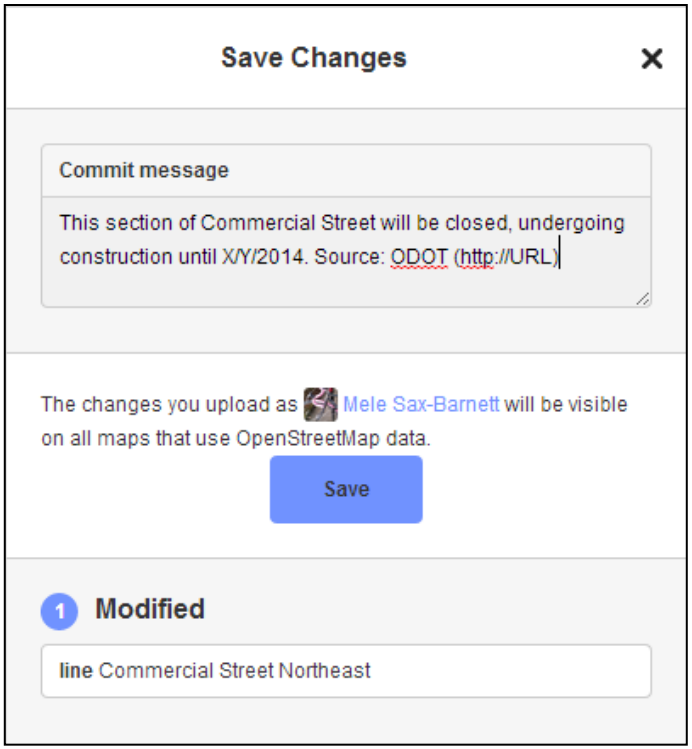
`highway=construction`
and
`construction=secondary`



Step 5: Save your edits



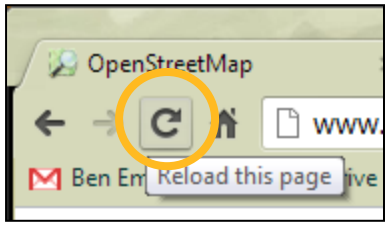
- Save early, save often
- This creates a "changeset" that is sent to the database
- **Give an informative changeset comment** *that includes what you were working on and your sources*
- What imagery are you using?



Step 6: View your edits

- Click "View on OSM" (or go to http://osm.org)
- *Hold down Ctrl while clicking refresh* to clear your browser's cache of map tiles (shift-refresh with Firefox)
- Should be updated within a few minutes

Ctrl +



More about editing

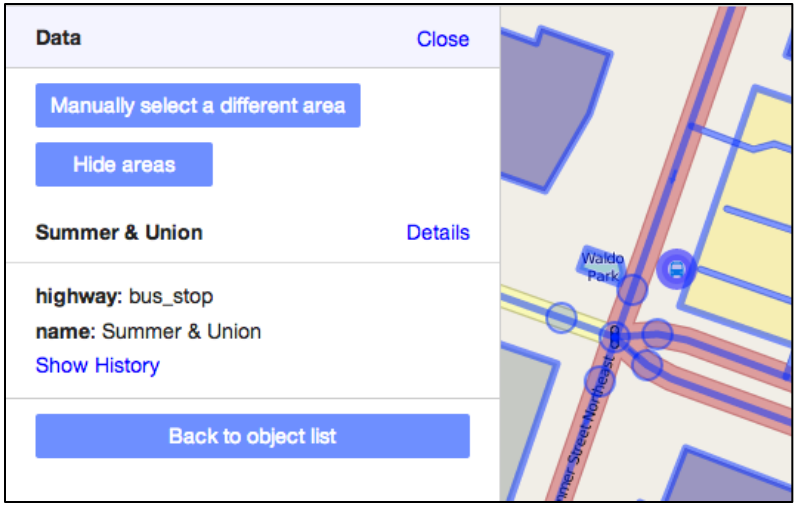
- JOSM (Java OpenStreetMap Editor) is another editor I highly recommend
  - Not too hard to learn, especially if you're familiar with GIS software
  - http://josm.openstreetmap.de/
  - http://learnosm.org
- Visit http://wiki.osm.org for tagging help, or ask on the newbies listserv http://lists.openstreetmap.org/listinfo/newbies

More about the OpenStreetMap data structure: Tags

- Tags are the equivalent of feature attributes
- They consist of two text fields, a key and a value
  - `highway = residential`
  - `leisure = park`
  - `bicycle = designated`
  - `cycleway = lane`
  - `foot = no`
  - `name = Salem Bus Station`

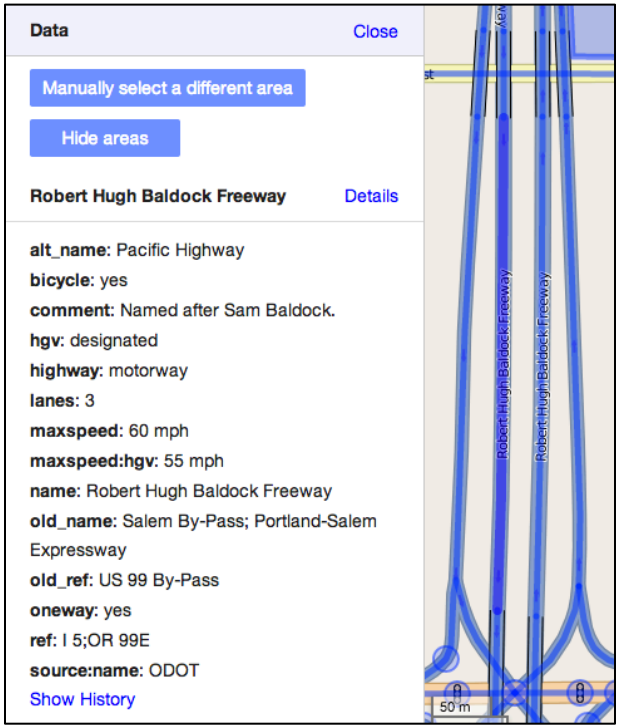
More about the OpenStreetMap data structure: Nodes

- Nodes:
  - A node/point can be used to mark a particular place on the map
  - For example, a bus stop may be marked using a node tagged with `highway = bus_stop`



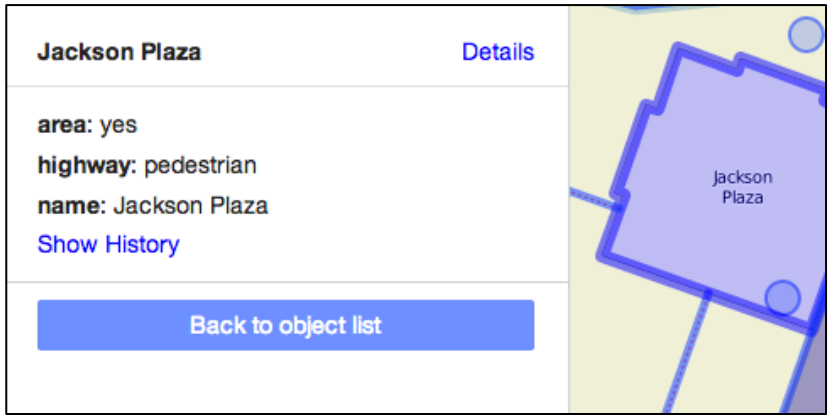
More about the OpenStreetMap data structure: Ways

- Ways:
  - A way is a line feature, made up of two or more connected nodes
  - For example, a freeway would be a way tagged with `highway = motorway`



More about the OpenStreetMap data structure: Areas

- Areas:
  - An area is a closed way
  - For example, a plaza would be an area tagged with `highway = pedestrian` and `area = yes`



Tags that can apply to ways or areas, like highway = pedestrian, may also require an area = yes tag

More about the OpenStreetMap data structure: Relations

- Relations:
  - Groups of nodes, ways, or areas
  - Types:
    - Route: includes interstate routes, cycling routes, and bus routes
    - Multipolygon: areas with multiple parts or holes
    - Boundary: for administrative boundaries
    - Restriction: to describe turn restrictions

OSM peculiarities to keep in mind

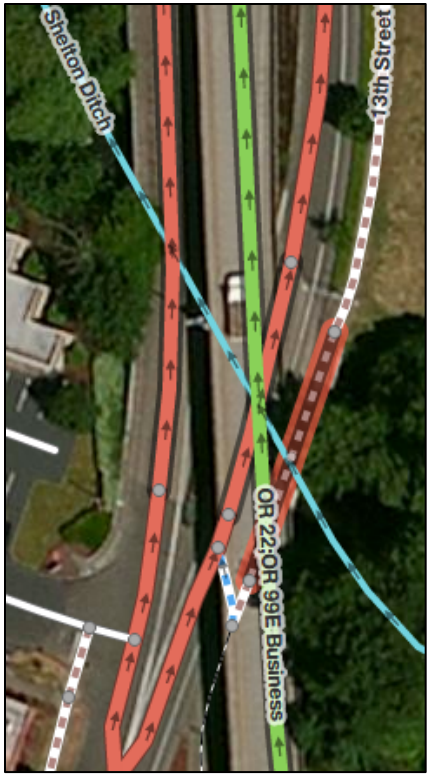
- Most keys and values should not be capitalized (the only exceptions are values for the "`name`" key)
- Avoid using abbreviations of any kind
- Local knowledge trumps jurisdictional datasets
- If you are editing to match a reference dataset, make sure you are allowed to use it for OpenStreetMap (read the license)

More OSM peculiarities

- Street names should be what you see on the street sign, but expand the abbreviation
- Highways may also have ref codes, which are not the same as the name
  - For example, I5 is known by many names (Robert Hugh Baldock Freeway, etc.) but it is always `ref = I 5`
- On and off ramps and service roads are generally unnamed
- Separated roadways should be mapped as separate ways in OpenStreetMap

Topology/Connectivity

- Does this street actually go through and connect to this other street?
- Adding new streets and paths
- Keeping up to date on prolonged closures due to construction projects
- Directionality (`one_way = yes`)



Topology/Connectivity

- Bridges and tunnels
  - Only connect them to other features according to reality (ok if they overlap other features)
  - `bridge = yes`
  - `tunnel = yes`
  - Associated layer tags:
    - `layer = 0` is implied, ground level
    - `layer = 1` is the next layer up
    - `layer = -1` is the next layer down
    - Continue incrementing up/down as needed

Highway classification

- `highway =`
  - `motorway`: freeway
  - `trunk`: not an official freeway, but bicycles and pedestrians not usually allowed
  - `primary`: major arterial
  - `secondary`: secondary arterial
  - `tertiary`: yellow centerline
  - `residential`: no centerline
  - `service`: often unnamed driveway or alley
- http://wiki.openstreetmap.org/wiki/Highway

Highway classification

- `_links`, for instance, `motorway_link`:
  - Defined by the highest-classification roadway it connects to
  - Unnamed links between named roadways
- Highways are for pedestrians and bicycles too
  - `footway`: primarily for foot traffic
  - `cycleway`: primarily for bicycle traffic
  - `path`: for both foot and bike traffic
  - `pedestrian`: wider way for pedestrian and bicycle traffic, occasional service vehicles
- http://wiki.openstreetmap.org/wiki/Highway

Access tags

- `access = no` : nobody can go there (unless you also add exceptions)
- `access = private` : only allowed if you are ending or beginning the trip there
- `bicycle = yes` : for places they're not usually allowed, like motorways and trunks
- `bicycle = designated`
- `foot = no`
- `psv = designated`, `bus = yes`
- http://wiki.openstreetmap.org/wiki/Access

Turn restrictions

- Relations that say you can or cannot go from one way to another via a particular node
  - A "type": no_right_turn, no_left_turn, no_u_turn, no_straight_on, only_right_turn, only_left_turn, only_straight_on
  - A "from" way, a "via" node, and a "to" way
  - Can except or apply to only certain kinds of vehicles or bicycles
- http://wiki.openstreetmap.org/wiki/Turn_restrictions

Bicycle facilities

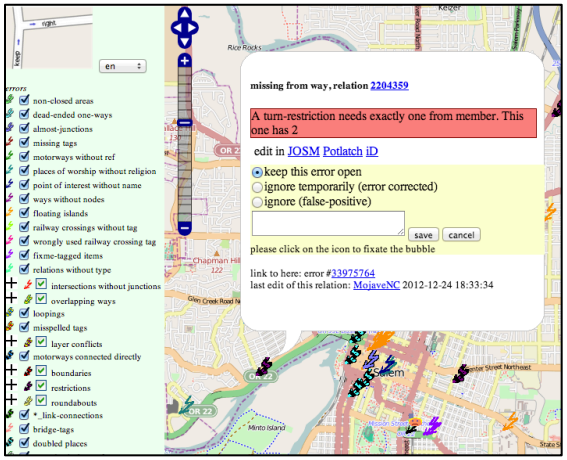
- `cycleway = lane` : bike lane
- `cycleway = opposite_lane` : bike lane going against traffic (for one way streets)
- `cycleway = shared_lane` : sharrows
- `cycleway = share_busway` : shared bike/bus lane
- `cycleway:right = lane`, `cycleway:left = shared_lane` : for when different sides of the street have different facilities
- http://wiki.openstreetmap.org/wiki/Cycleway

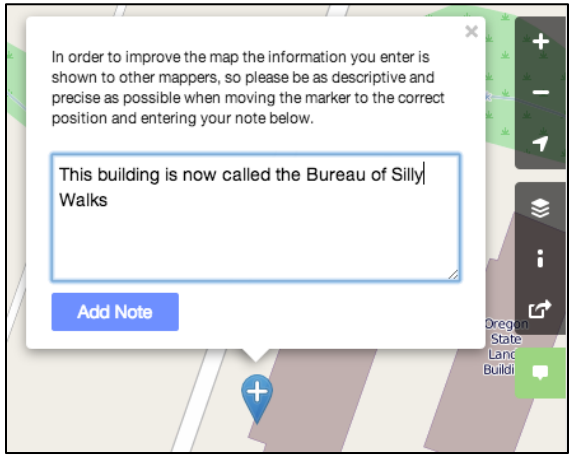
Resources

- http://wiki.osm.org
- http://help.osm.org
- Ask on the newbies listserv: http://lists.openstreetmap.org/listinfo/newbies

More resources

- QA tools:
  - http://wiki.openstreetmap.org/wiki/Quality_assurance
  - Keep right: http://keepright.ipax.at/
  - Notes: http://wiki.openstreetmap.org/wiki/Notes





Try it!

Practice time!

1. Try adding a new walkway or road, and make sure you connect it to the surrounding features correctly
2. Try changing a road classification or adding a bike lane tag
3. See if you can figure out how to split or orthagonalize a feature, or change the direction of a way

- You can always re-run the iD walkthrough or look at the manual (behind the book icon) if you forget how to do something
- I'm here if you need any help!