



An Introduction to OpenStreetMap

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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



OpenStreetMap
The Free Wiki World Map

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>

 flickr® from Yahoo!

 foursquare

 craigslist



 TRI MET



MapBox

(you)

 m^a mapquest



WIKIPEDIA
The Free Encyclopedia

 NYC.gov

 URBAN AIRSHIP



What kind of things can you find in OpenStreetMap?

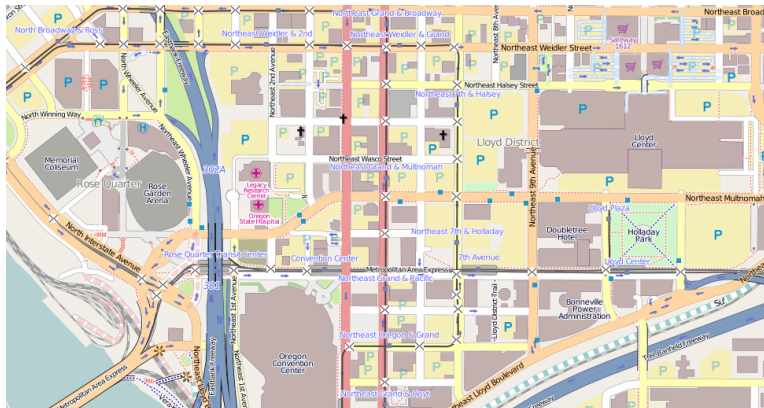
- Roads, highways, bridges, and tunnels
- Bus stops, bus routes, bike routes, and railways
- Businesses: shops, restaurants, bars
- Buildings: schools, churches, houses
- Parks, lakes, mountains, and even trees
- Airports, power networks, and mailboxes
- Administrative boundaries
- Almost anything that 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



MapBox

MapQuest

What does it look like?

The screenshot displays the OpenStreetMap web application interface. On the left, there is a sidebar with the OpenStreetMap logo, a search bar, and links for help, community, and data. The main content area is divided into three sections: a 'Data' panel for 'Court Street Northeast' showing details like highway type and location, a 'Map Layers' panel on the right with options like Standard, Cycle Map, and Transport Map, and a central map view showing the street and surrounding area. The map includes labels for 'Court Street Northeast', 'Wilson State Park', and 'Oregon State Capitol'. A scale bar at the bottom left indicates 20 meters.

OpenStreetMap
The Free Wiki World Map

Search

examples: "Alkmaar", "Regent Street, Cambridge", "CB2 5AQ", or "post offices near Lünen" [more examples...](#) [Where am I?](#)

OpenStreetMap is a free worldwide map, created by people like you.
The data is free to download and use under its open license.
[Create a user account](#) to improve the map.

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

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

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

State of the Map 2013
6-8 September
Birmingham, UK

[Make a Donation](#)

Hosting is supported by the UCL VR Centre, Imperial College London and Bytemark Hosting, and other partners.

View **Edit** **History**

Data [Close](#)

[Manually select a different area](#) [Hide areas](#)

Court Street Northeast [Details](#)

highway: secondary
is_in: Marion, OR
name: Court Street Northeast
oneway: yes
tiger:zip_left: 97301
tiger:zip_right: 97301
[Show History](#)

[Back to object list](#)

Map Layers [Close](#)

[log in](#) [sign up](#)

[Standard](#)
[Cycle Map](#)
[Transport Map](#)
[MapQuest Open](#)

Enable overlays for troubleshooting the map

☐ Map Notes
☒ Map Data

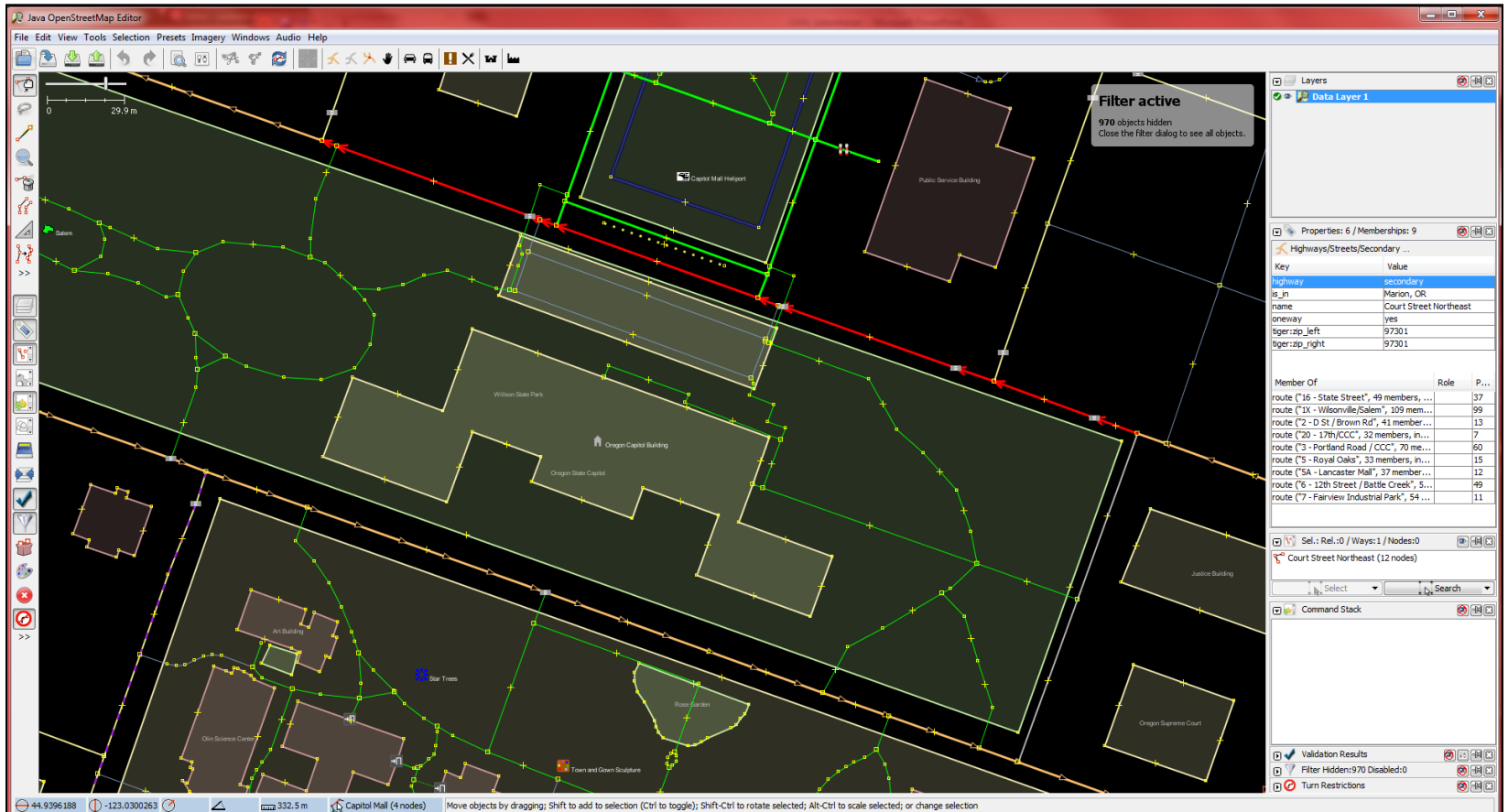
20 m
50 ft

© OpenStreetMap contributors

What does it look like?



What does it look like?



OSM data

Properties: 6 / Memberships: 9

Highways/Streets/Secondary ...

Key	Value
highway	secondary
is_in	Marion, OR
name	Court Street Northeast
oneway	yes
tiger:zip_left	97301
tiger:zip_right	97301

Member Of	Role	P...
route ("16 - State Street", 49 members, ...)		37
route ("1X - Wilsonville/Salem", 109 mem...		99
route ("2 - D St / Brown Rd", 41 member...		13
route ("20 - 17th/CCC", 32 members, in...		7
route ("3 - Portland Road / CCC", 70 me...		60
route ("5 - Royal Oaks", 33 members, in...		15
route ("5A - Lancaster Mall", 37 member...		12
route ("6 - 12th Street / Battle Creek", 5...		49
route ("7 - Fairview Industrial Park", 54 ...)		11

Sel.: Rel.:0 / Ways:1 / Nodes:0

Court Street Northeast (12 nodes)

Select Search

JOSM



iD



All tags (6)

highway	secondary		
is_in	Marion, OR		
name	Court Street Northe...		
oneway	yes		
tiger:zip_left	97301		
tiger:zip_right	97301		

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All relations (9)

Bus Route 2 - D St / Brown Rd

Role

Bus Route 1X - Wilsonville/Salem

Role

Route 5 - Royal Oaks

Role

Bus Route 3 - Portland Road / CCC

Role

Route 5A - Lancaster Mall

Role

Bus Route 20 - 17th/CCC

Role

Bus Route 16 - State Street

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

Data Close

[Manually select a different area](#)

[Hide areas](#)

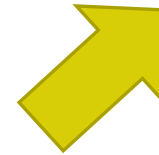
Object list

Node [Oregon Capitol Building](#)

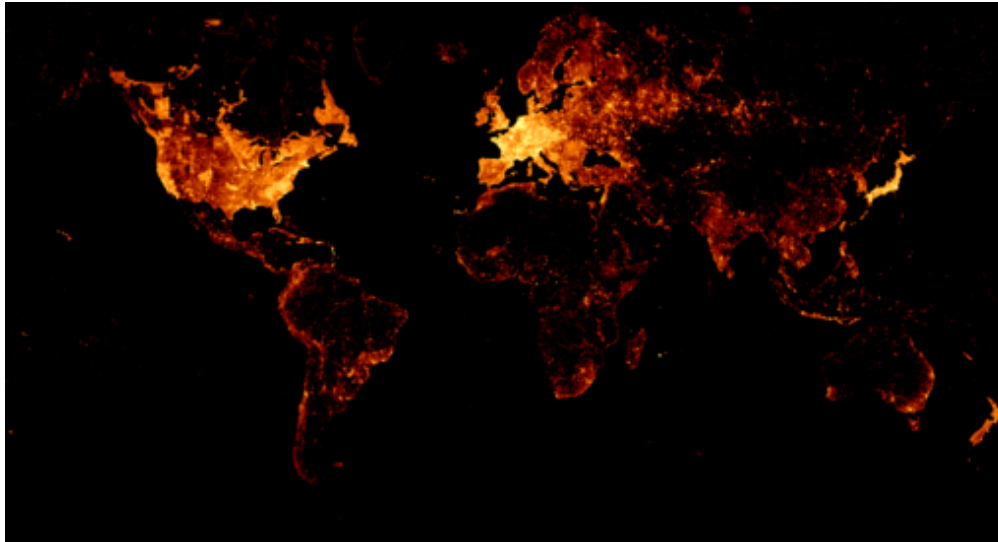
Way [163748503](#)

Way [Oregon State Capitol](#)

[Retrieve this area from the API](#)



Taking the next step: Editing OpenStreetMap



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

How do you edit OSM?

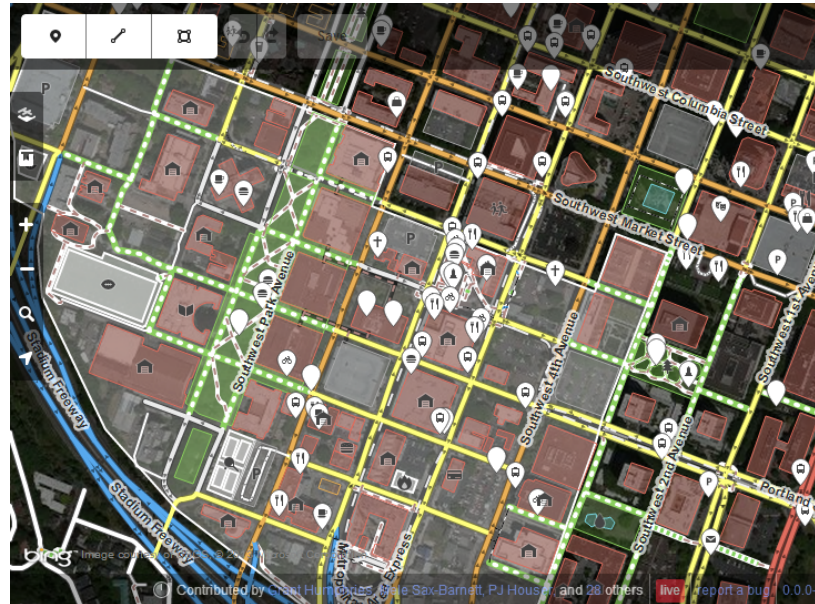
1. Sign up for an account
2. Choose one of several free and open source editors
 - iD and JOSM are popular
 - Examples here will be using iD, a new in-browser editor



iD



JOSM

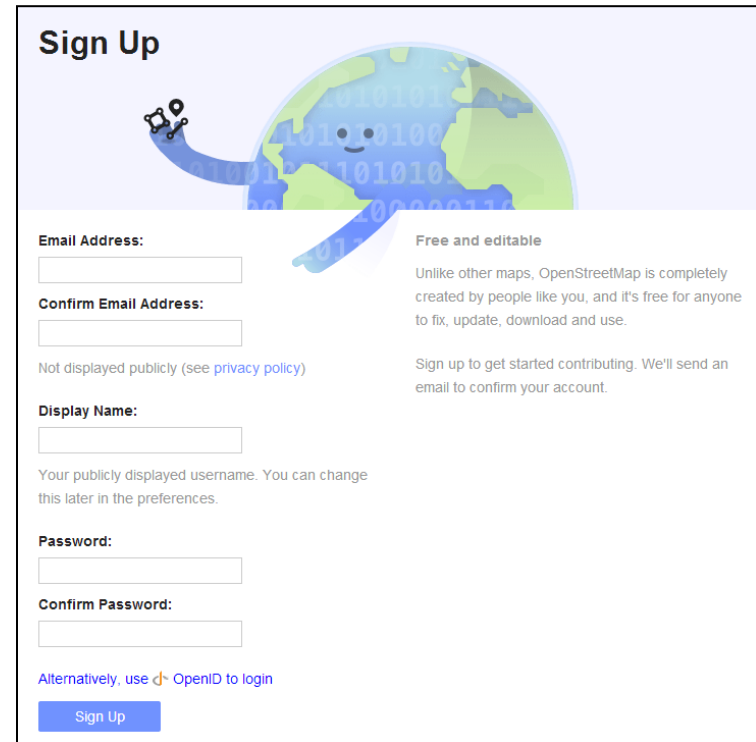


Step 1: Sign up for an account

- Go to <http://osm.org>
- Click the “sign up” link in the top right corner



- Set up your account!



Sign Up

Email Address:

Confirm Email Address:

Not displayed publicly (see [privacy policy](#))

Display Name:

Your publicly displayed username. You can change this later in the preferences.

Password:

Confirm Password:

Alternatively, use [OpenID](#) to login

[Sign Up](#)

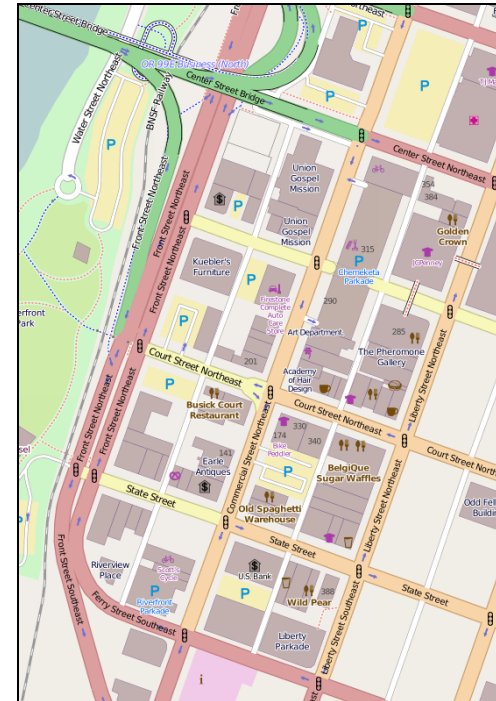
Free and editable

Unlike other maps, OpenStreetMap is completely created by people like you, and it's free for anyone to fix, update, download and use.

Sign up to get started contributing. We'll send an email to confirm 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?

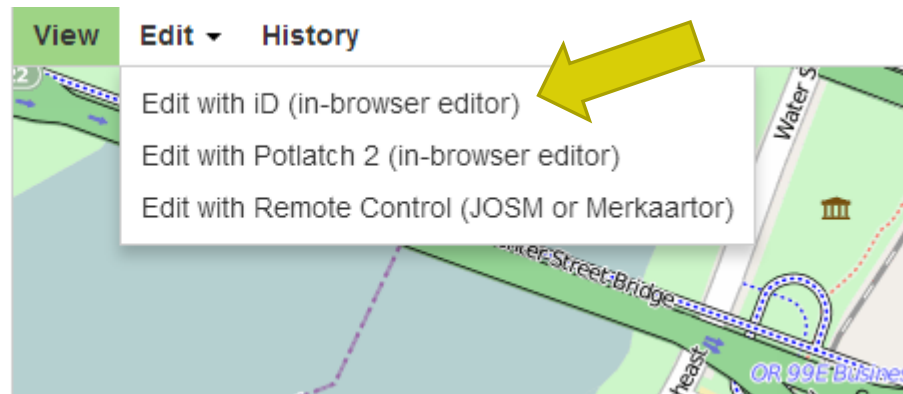


Step 3: Getting started with iD

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

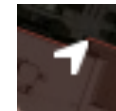
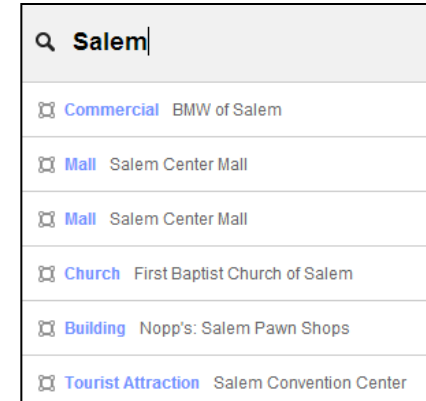


[Start the Walkthrough](#)



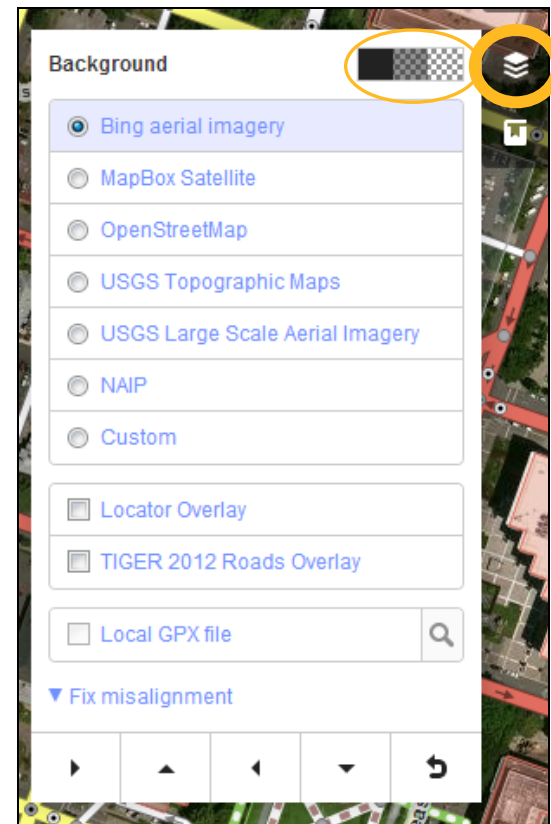
Step 3: Getting started with iD

- 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`

▼ All tags (9)

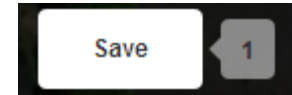
bicycle	designated	🗑️	ℹ️
cycleway	shared_lane	🗑️	ℹ️
highway	construction	🗑️	ℹ️
is_in	Marion, OR	🗑️	ℹ️
name	Commercial Street..	🗑️	ℹ️
oneway	yes	🗑️	ℹ️
tiger:zip_left	97306	🗑️	ℹ️
tiger:zip_right	97306	🗑️	ℹ️
construction	secondary	🗑️	ℹ️

+



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?



Save Changes

Commit message

This section of Commercial Street will be closed, undergoing construction until X/Y/2014. Source: [ODOT](#) ([http://URL](#))

The changes you upload as  [Mele Sax-Barnett](#) will be visible on all maps that use OpenStreetMap data.

Save

1 Modified

line Commercial Street Northeast

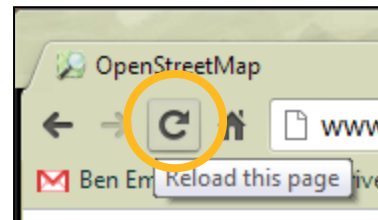
Step 6: View your edits

- 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



View on OSM

Ctrl +



More about editing

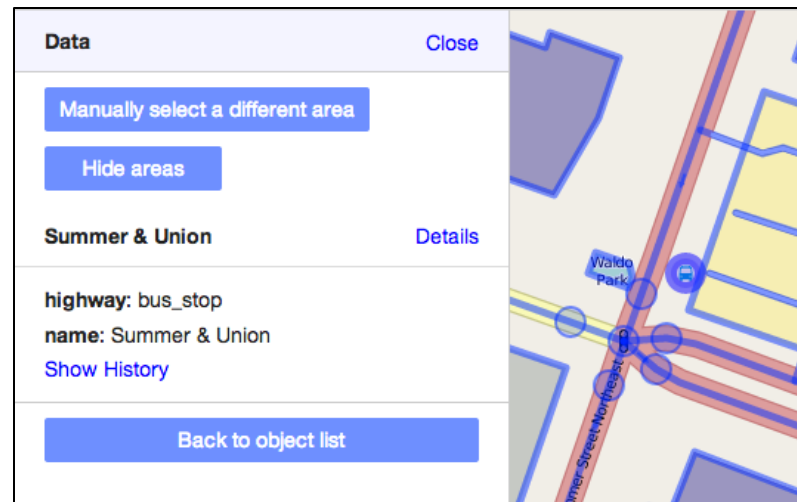
- JOSM (Java OpenStreetMap Editor) is another editor I highly recommend
 - Not too hard to learn, especially if you're familiar with GIS software
 - <http://josm.openstreetmap.de/>
 - <http://learnosm.org>
- Visit <http://wiki.osm.org> for tagging help, or ask on the newbies listserv
<http://lists.openstreetmap.org/listinfo/newbies>

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`

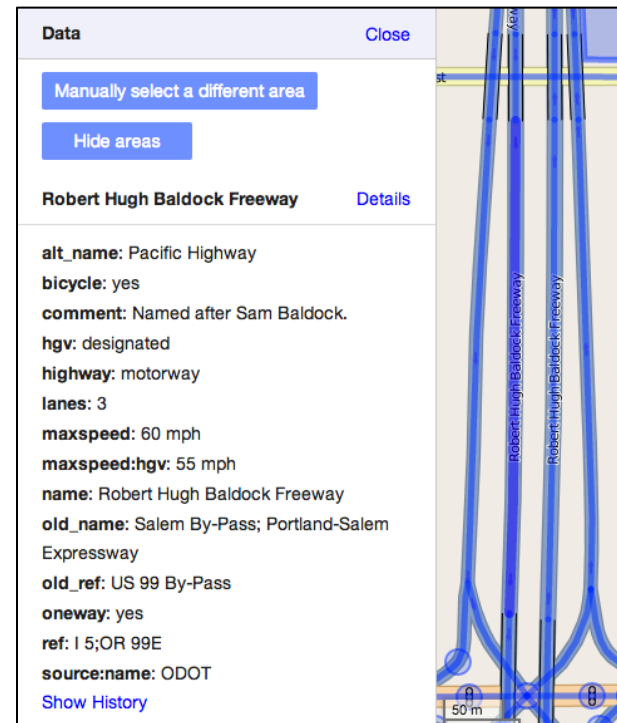
More about the OpenStreetMap data structure: Nodes

- 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`



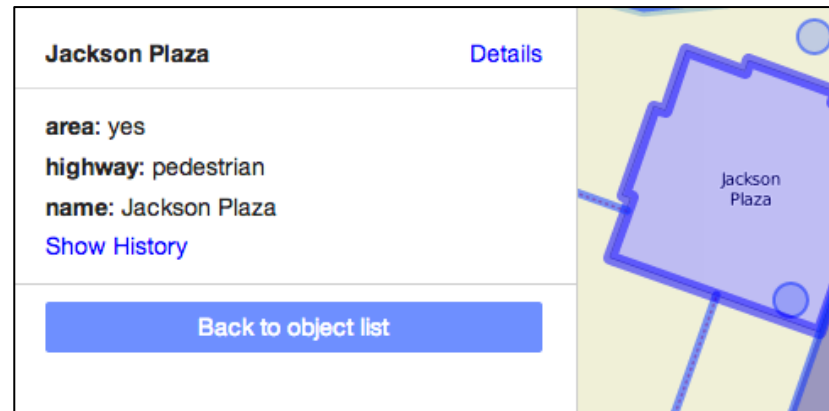
More about the OpenStreetMap data structure: Ways

- 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

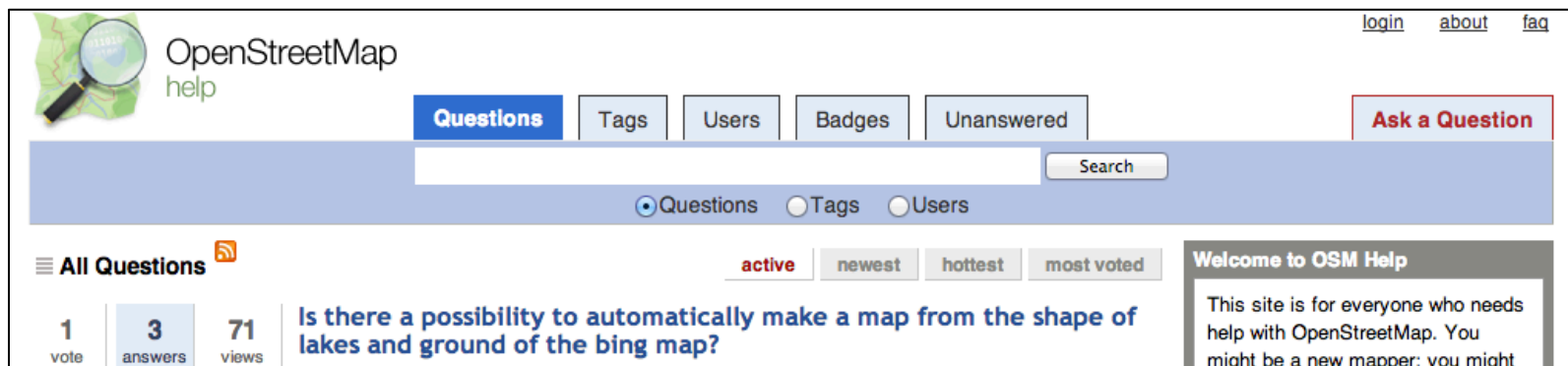
- Relations that say you can or cannot go from one way to another via a particular node
 - A “type”: no_right_turn, no_left_turn, no_u_turn, no_straight_on, only_right_turn, only_left_turn, only_straight_on
 - A “from” way, a “via” node, and a “to” way
 - Can except or apply to only certain kinds of 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>



The screenshot shows the OpenStreetMap help page. At the top left is the OpenStreetMap logo with a magnifying glass over a map. To its right is the text "OpenStreetMap help". In the top right corner are links for "login", "about", and "faq". Below the logo is a navigation bar with buttons for "Questions", "Tags", "Users", "Badges", and "Unanswered". To the right of these buttons is a red button that says "Ask a Question". Below the navigation bar is a search bar with a "Search" button. Below the search bar are radio buttons for "Questions", "Tags", and "Users", with "Questions" selected. Below the radio buttons is a section titled "All Questions" with a small orange icon. To the right of this title are filters: "active", "newest", "hottest", and "most voted". Below the filters is a table showing the details of a question. The table has three columns: "vote", "answers", and "views". The first row shows "1", "3", and "71" respectively. To the right of the table is the question text: "Is there a possibility to automatically make a map from the shape of lakes and ground of the bing map?". On the right side of the page is a grey box titled "Welcome to OSM Help" containing the text: "This site is for everyone who needs help with OpenStreetMap. You might be a new mapper; you might".

OpenStreetMap help

login about faq

Questions Tags Users Badges Unanswered Ask a Question

Search

Questions Tags Users

All Questions

active newest hottest most voted

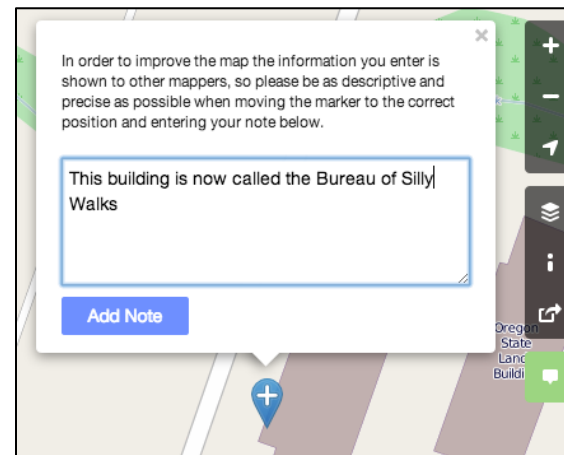
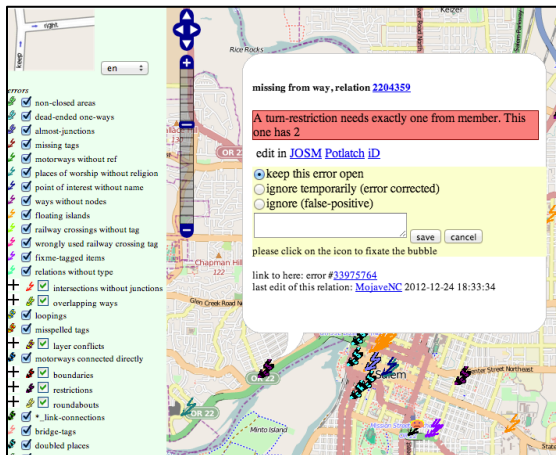
1	3	71	Is there a possibility to automatically make a map from the shape of lakes and ground of the bing map?
vote	answers	views	

Welcome to OSM Help

This site is for everyone who needs help with OpenStreetMap. You might be a new mapper; you might

More resources

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



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 orthogonalize 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!