Run an OpenStreetMap cache server for Asian Users

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**NCHC, Taiwan*
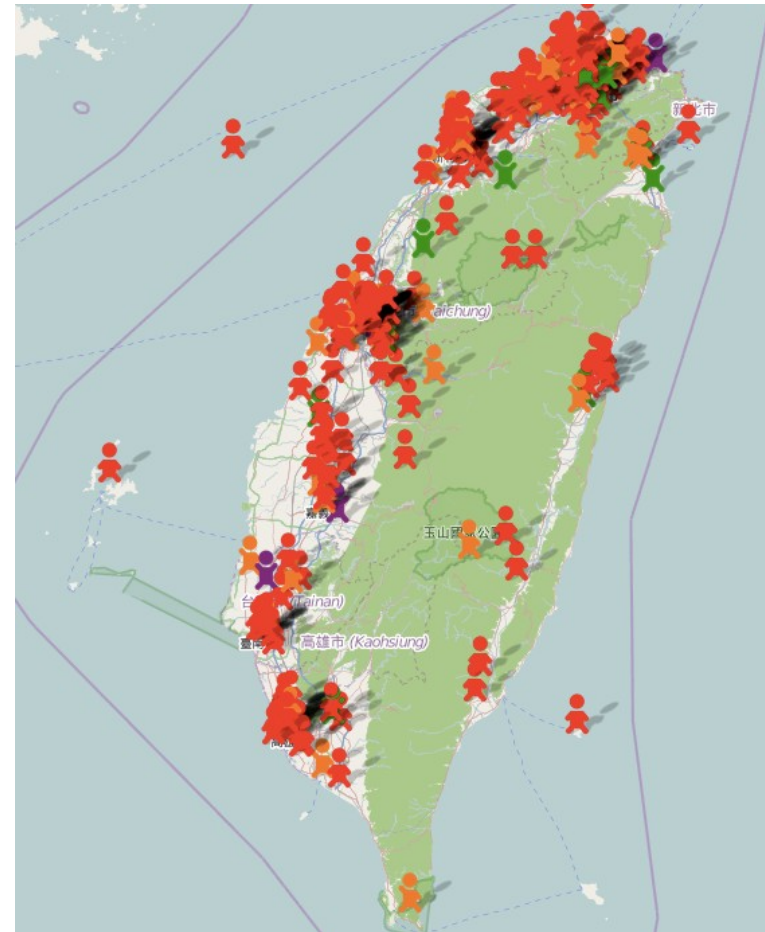
Q2, 2015

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Outline

- Introduction to OSM Taiwan
- Cache server
  - Why?
  - NCHC's capacity
  - Hardware, network
  - OS, services
  - Maintenance
- Q&A

Clonezilla
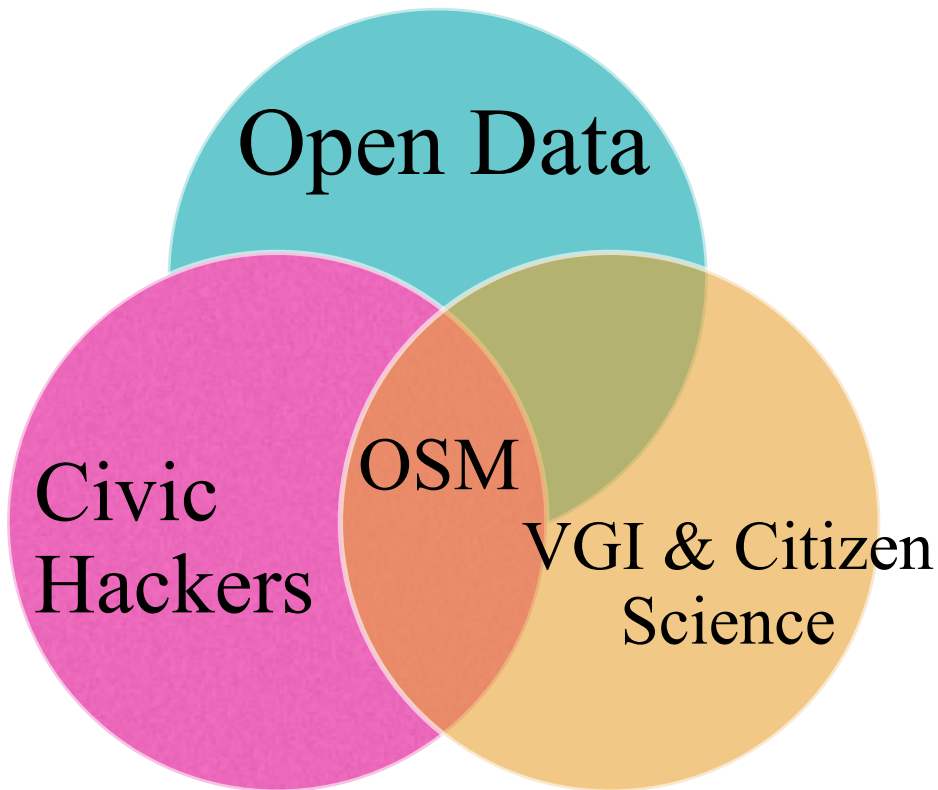
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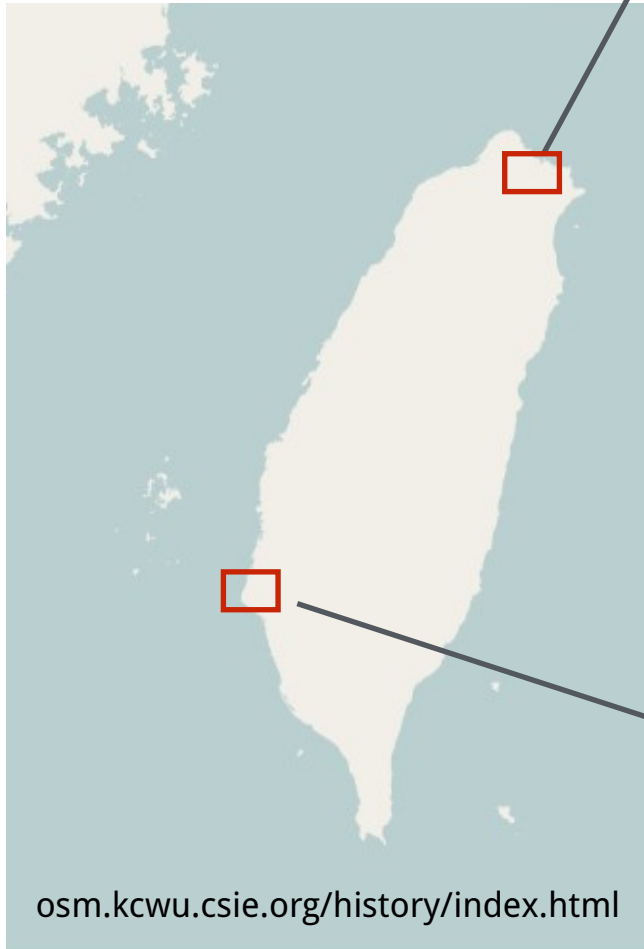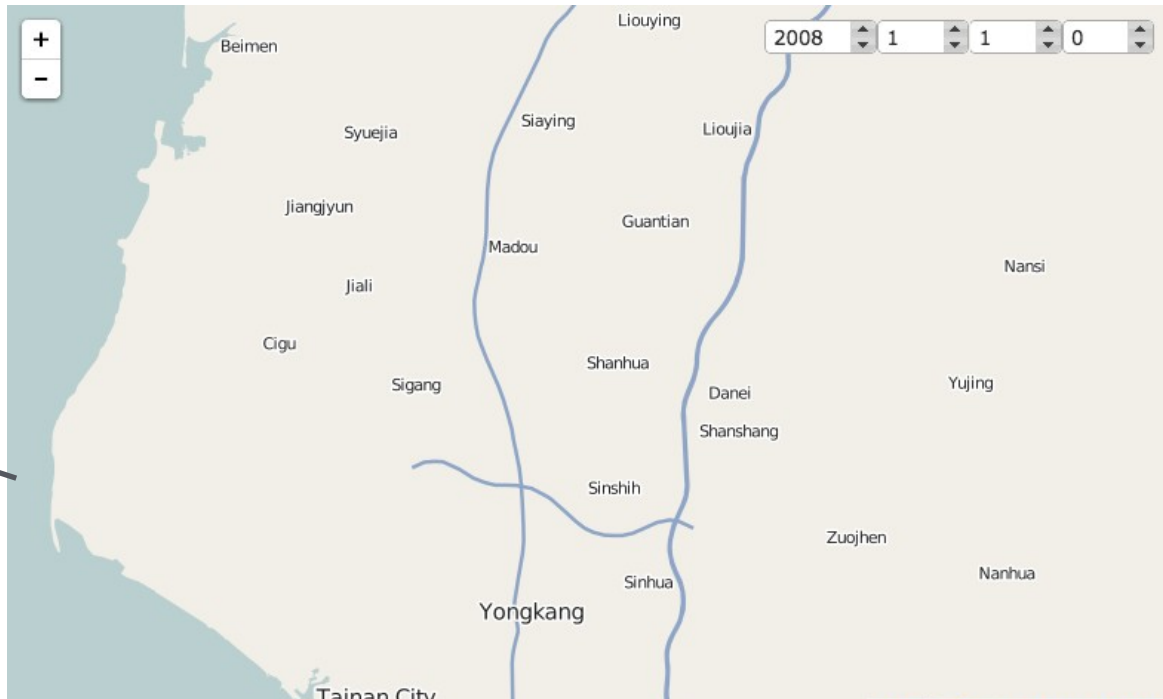 - Hardware, network
  - OS, services
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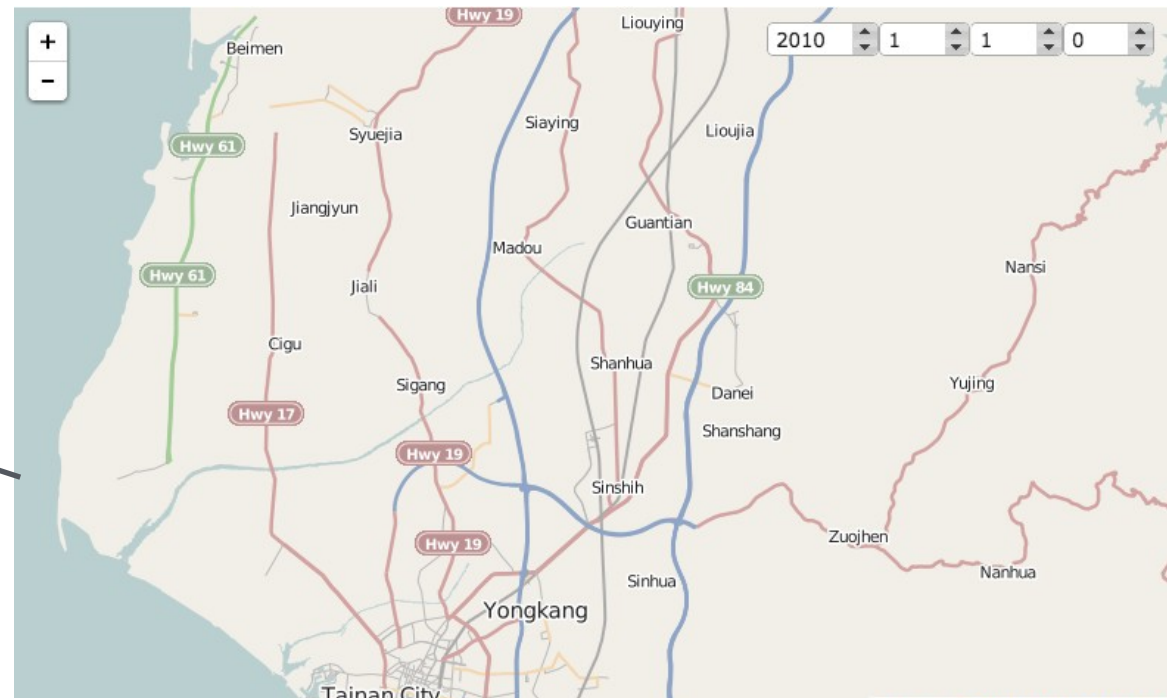
Clonezilla

OpenStreetMap Taiwan

2007

osm.kcwu.csie.org/history/index.html

2007 1 1 0

Leaflet | © OpenStreetMap contributors

2007 1 1 0

2008

osm.kcwu.csie.org/history/index.html

2009

osm.kcwu.csie.org/history/index.html

2010

osm.kcwu.csie.org/history/index.html

2011

2012

osm.kcwu.csie.org/history/index.html
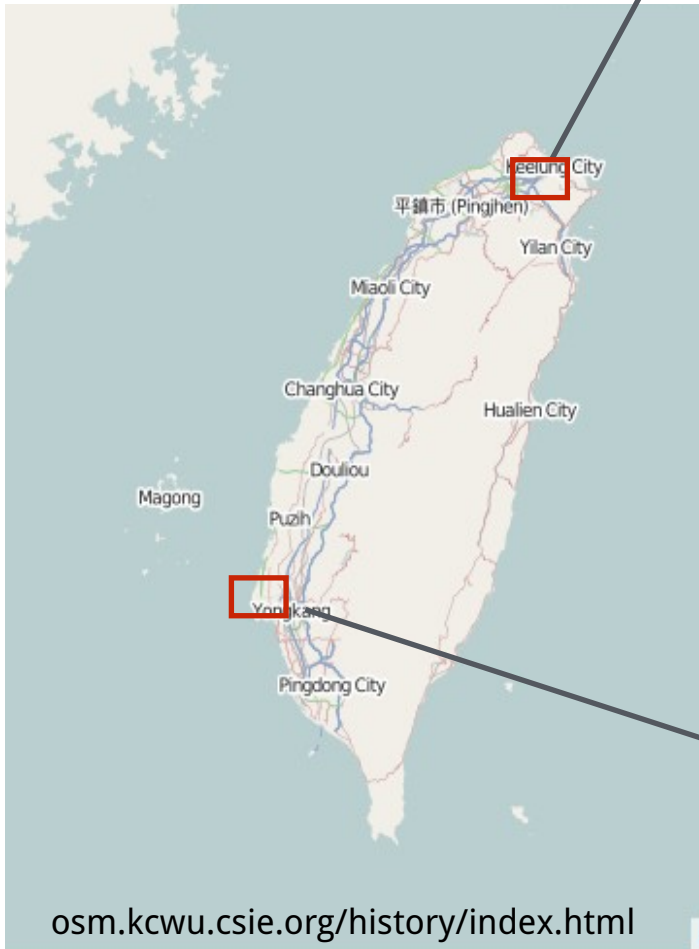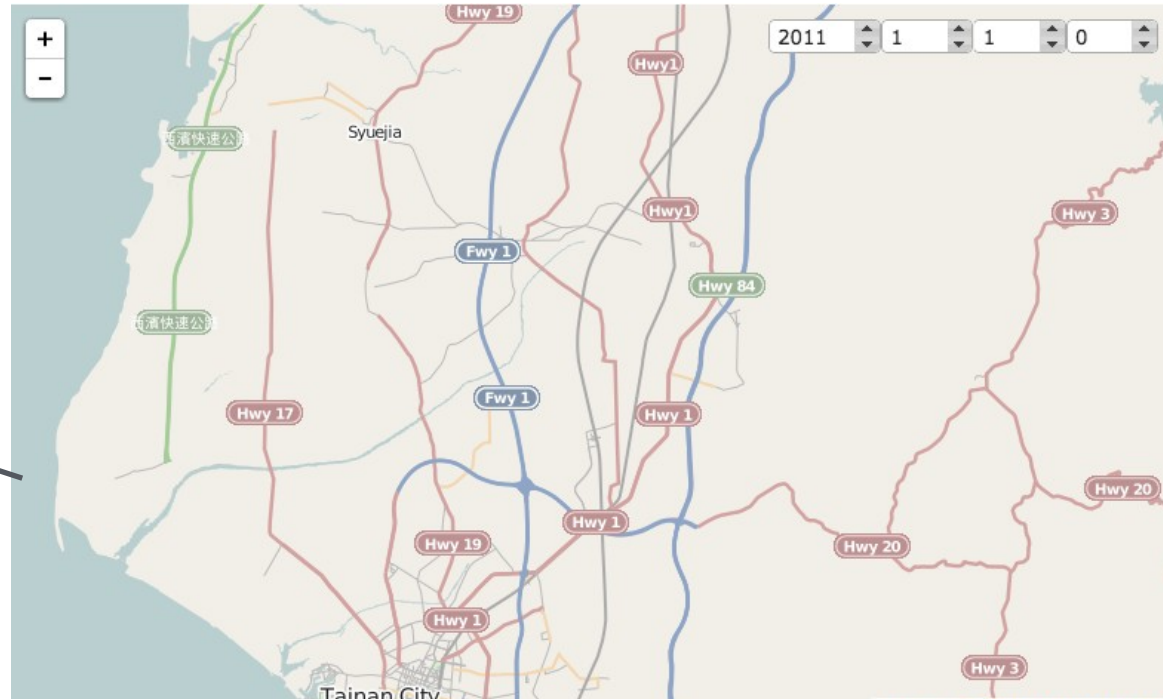
2013

osm.kcwu.csie.org/history/index.html
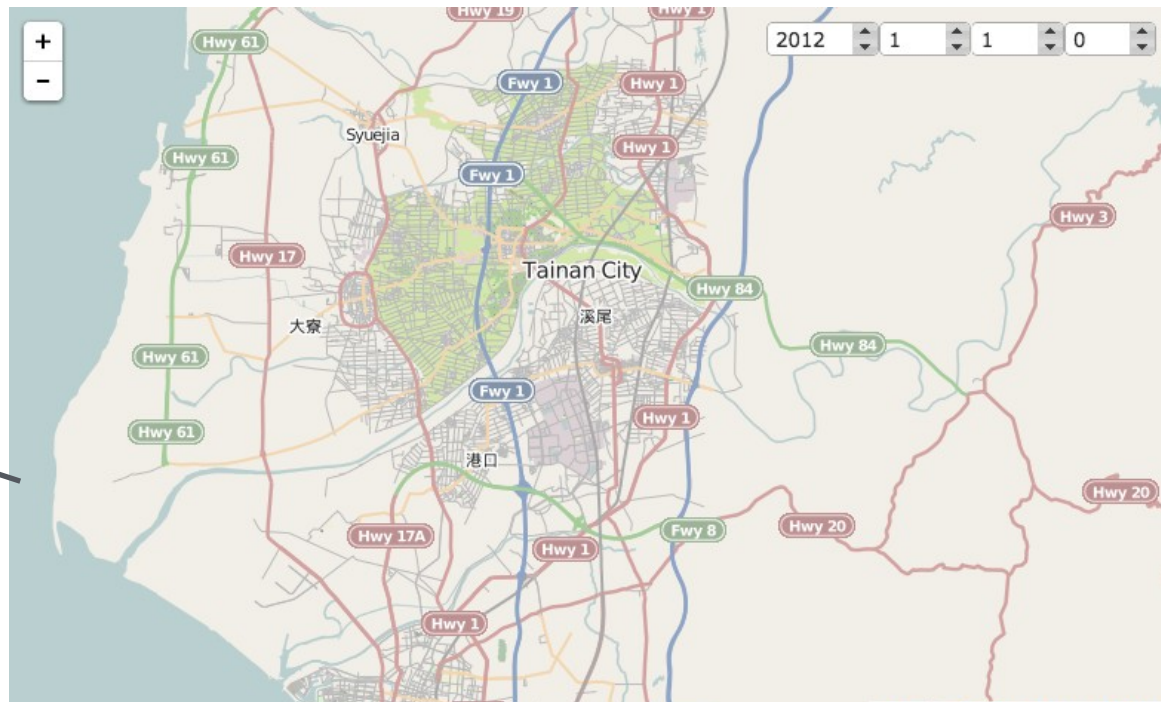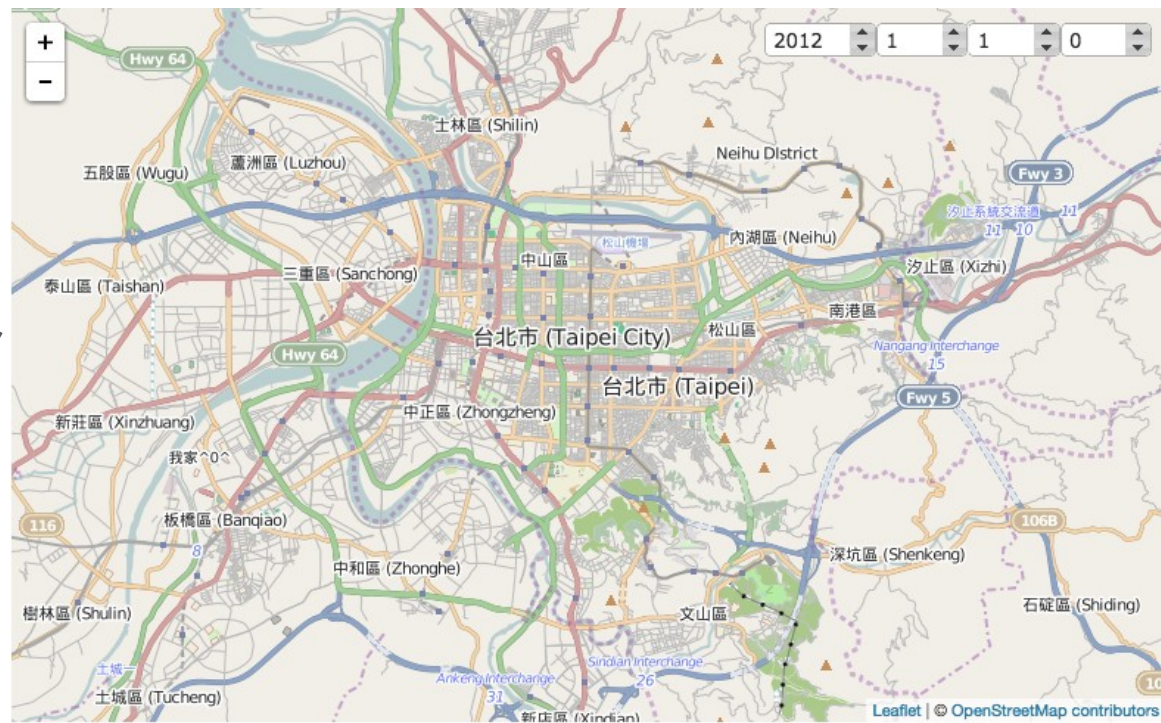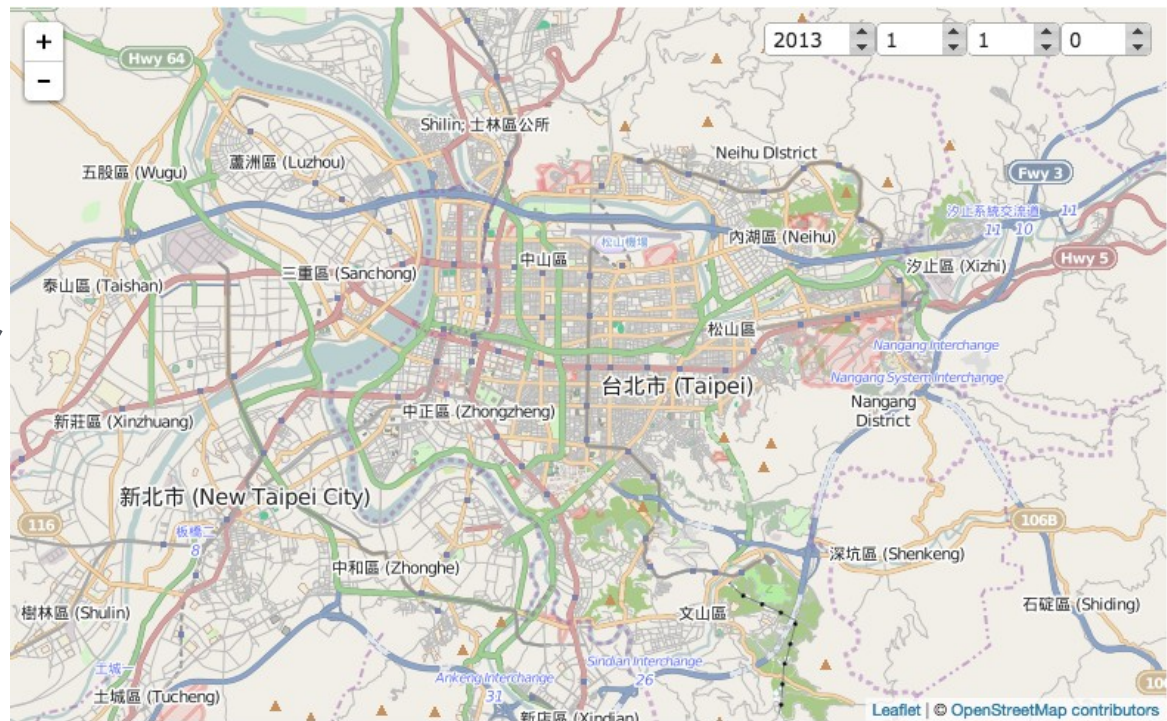
2014

osm.kcwu.csie.org/history/index.html
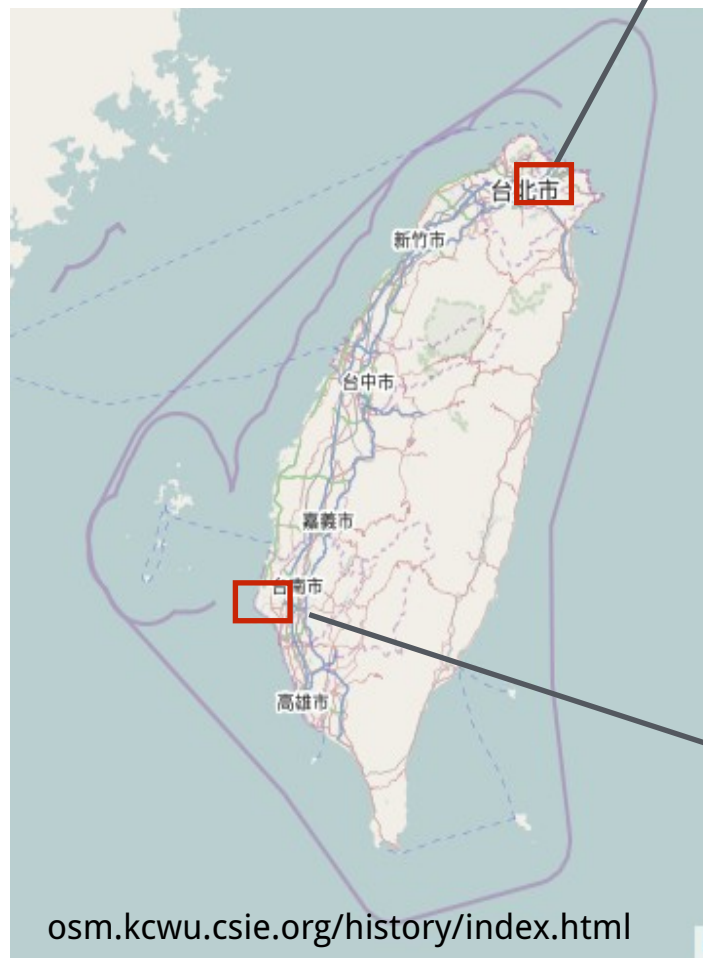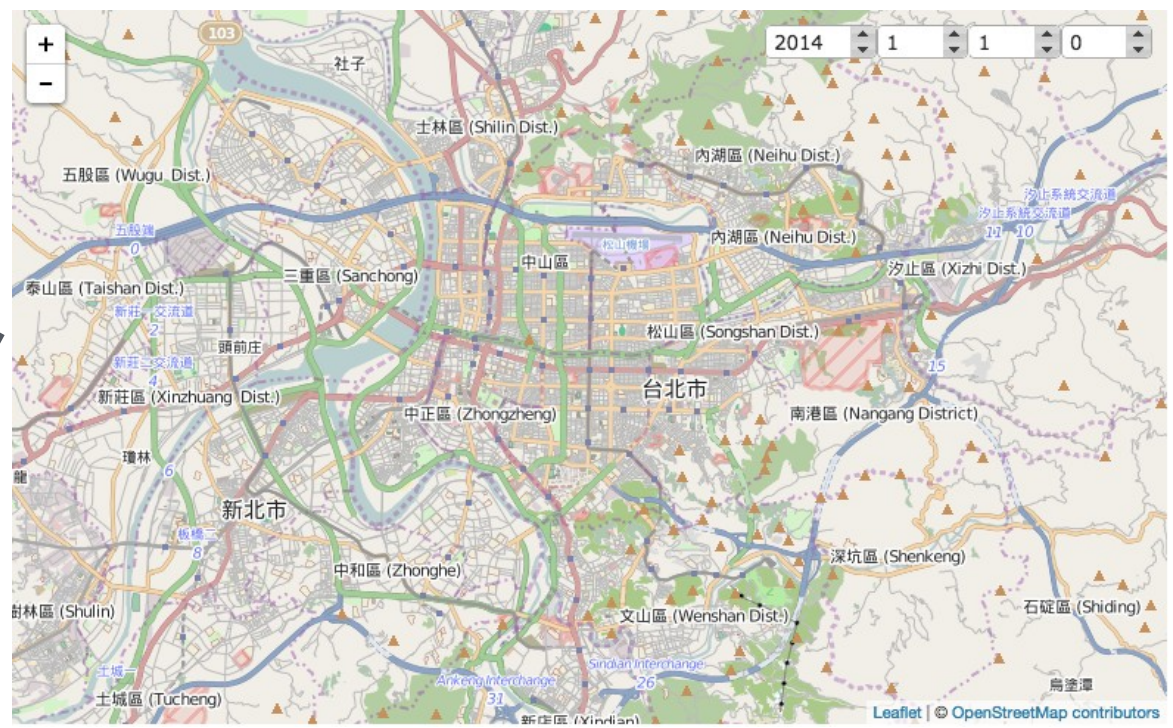
The growth of nodes

Nodes

- nodes
- Cum. Nodes
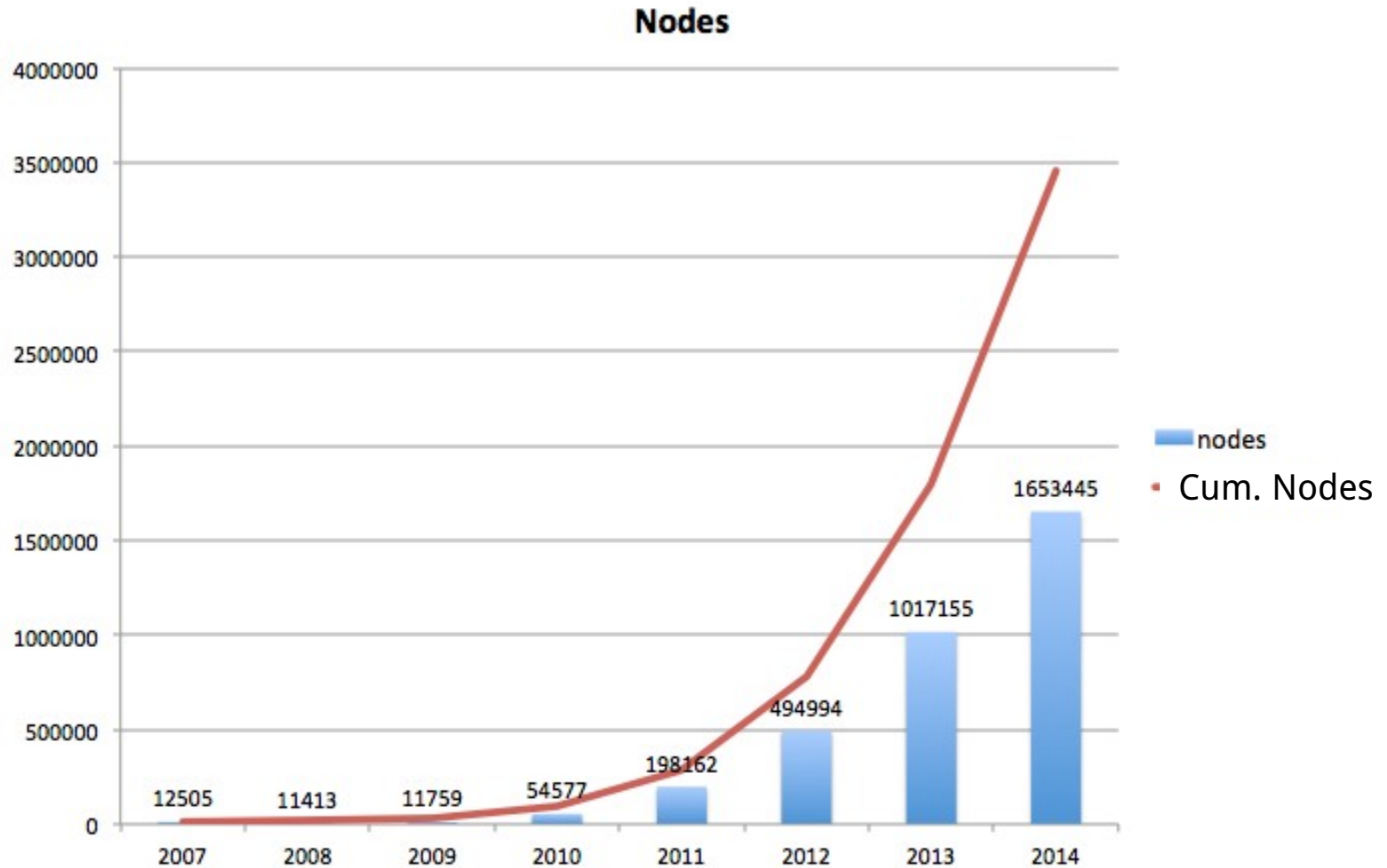
The growth of ways

Ways
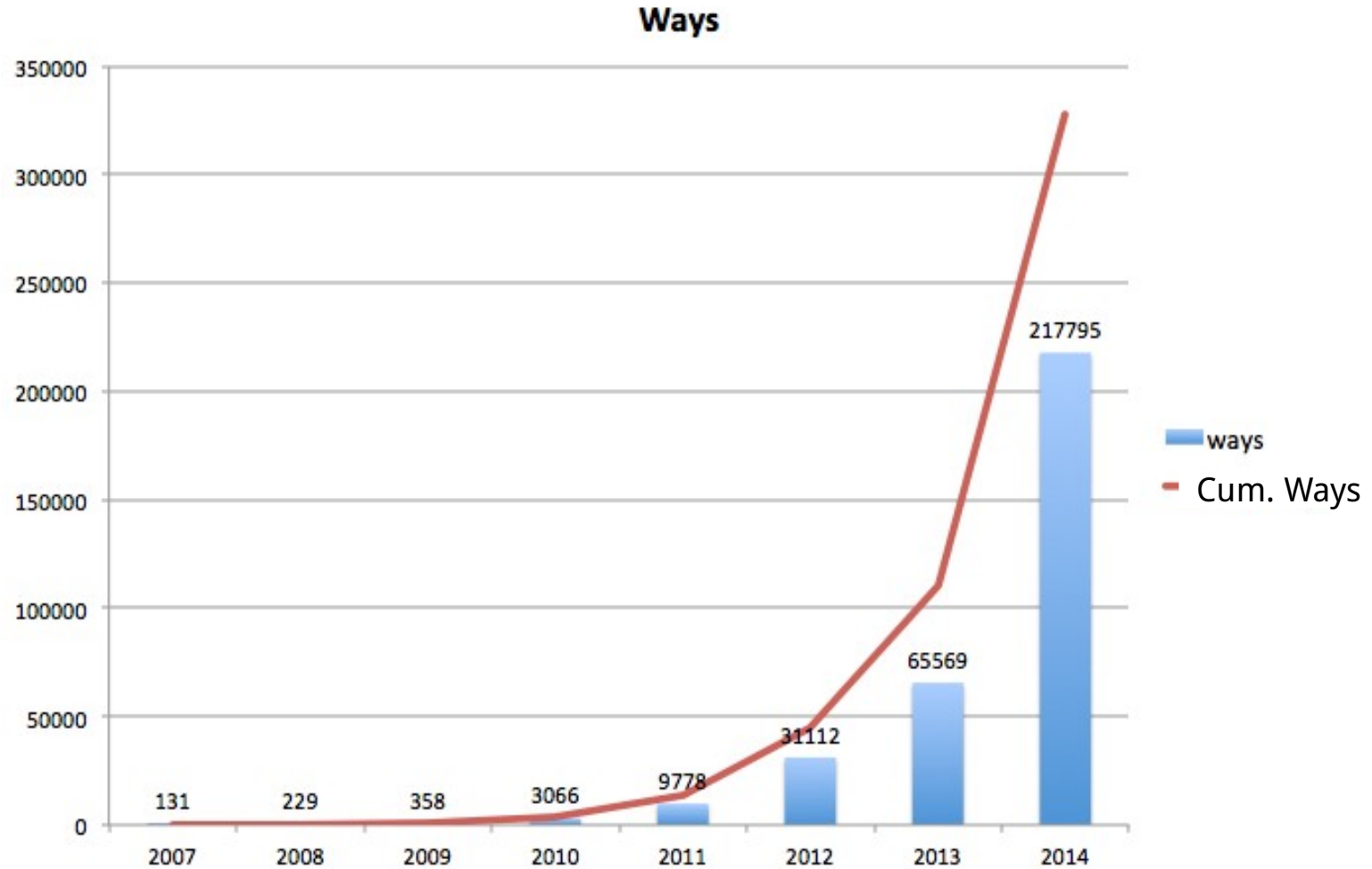
The growth of relations
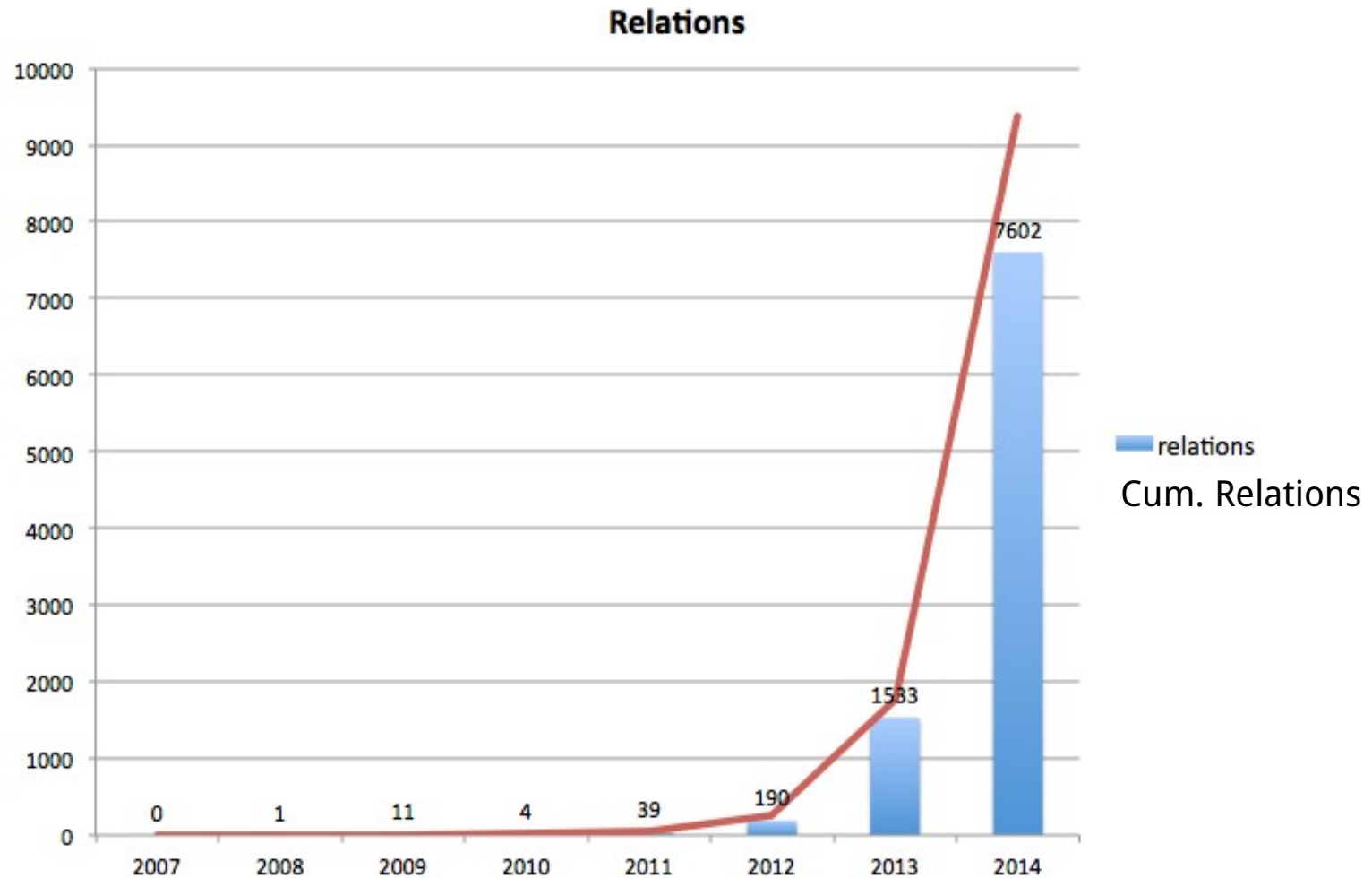
The growth of users
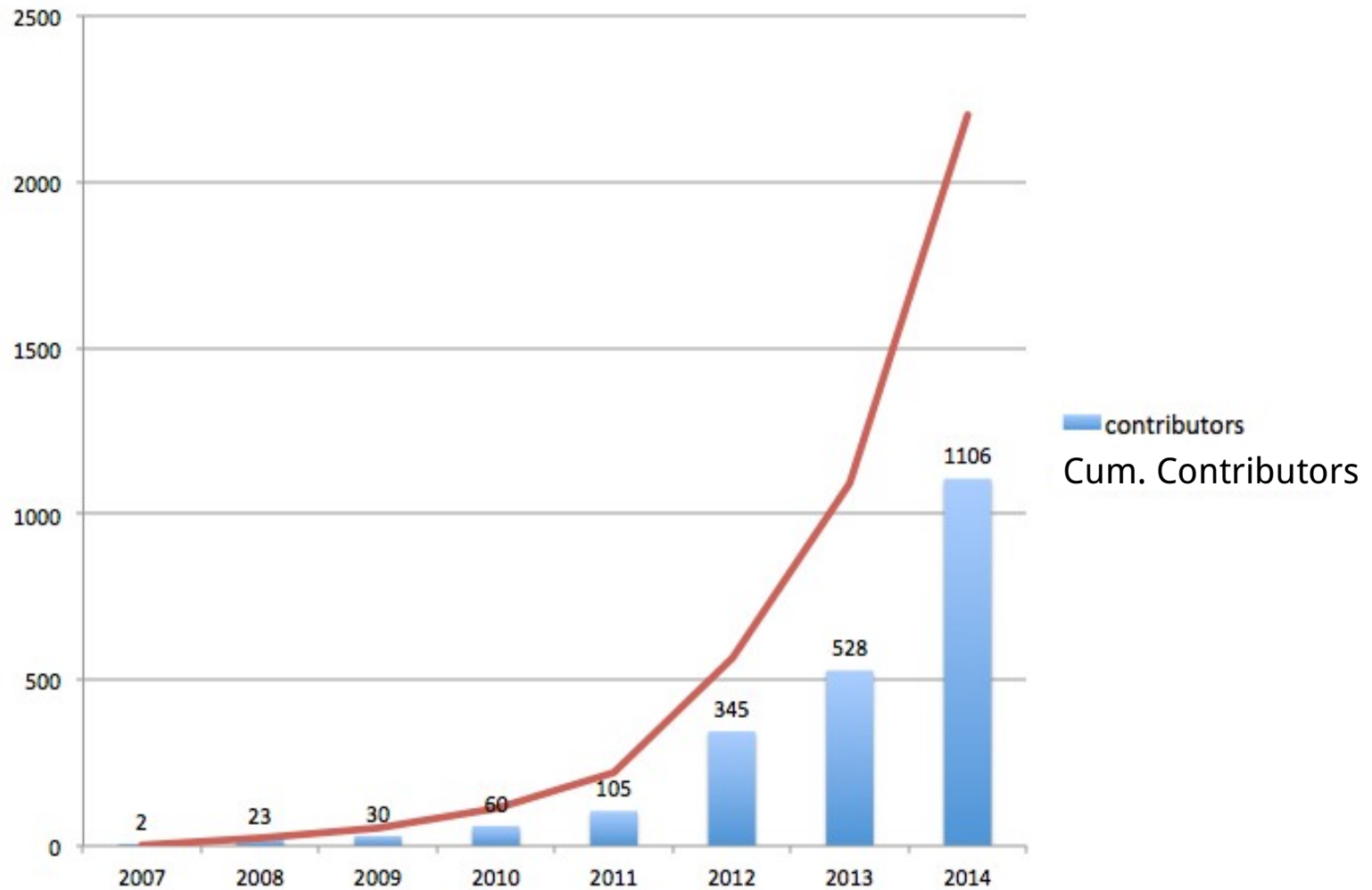
Mapping parties

Mapping Party
for local history and culture

Japanese immigrant villages at the period when Taiwan under Japanese rule

http://tools.geofabrik.de/mc/?mt0=mapnik&mt1=googlemap&lon=121.50807&lat=23.84155&zoom=17
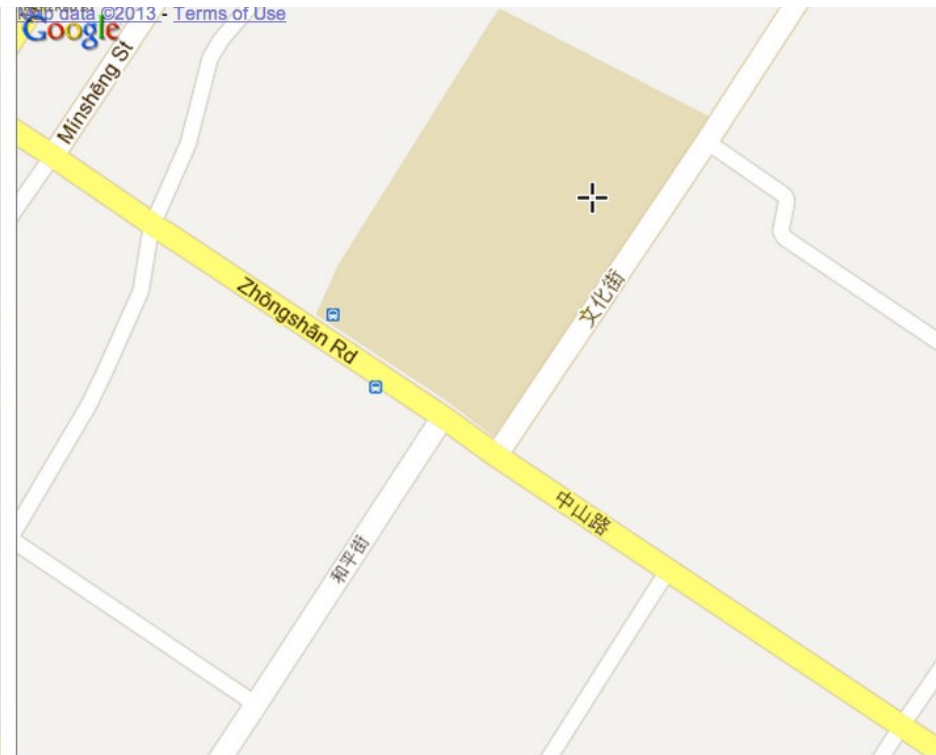
OSM Mapping team for aboriginal tribes (Sedek and Taroko)

Mapping for trials' surface
Taiwan Trail Volunteer x OSM TW

itoį map If you have any comments or suggestions you can mail us here.

login

Surfaces

FV87

E 1;40

E ;4C

E 134;40

E 134;40

286

Brandknattene

FV87

itoį

NR
NR NR NR
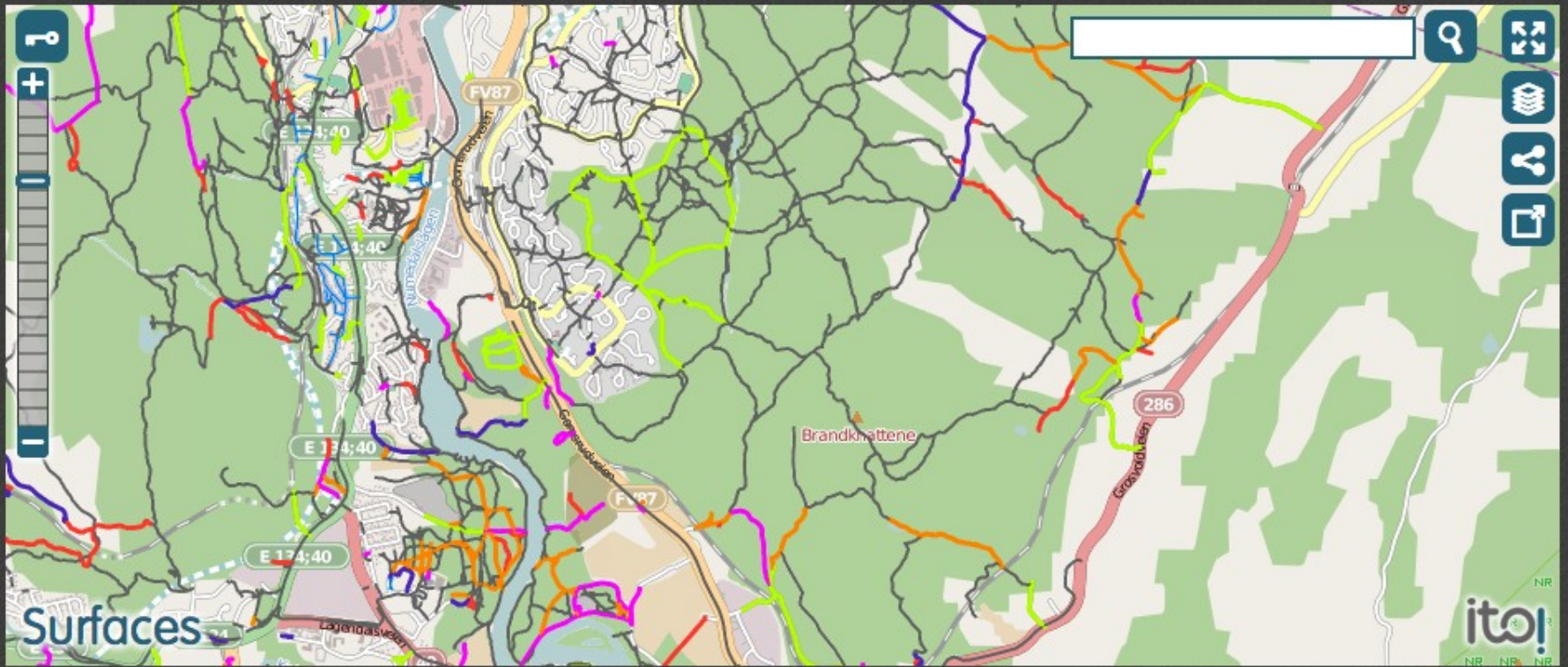
Common values of tracktype=* and surface=* in OpenStreetMap .

Purpose

This map is mainly useful for OpenStreetMap contributors who want to ensure that surfaces are correctly tagged in an area.

paved etc = surface values of: paved, concrete, asphalt, sealed, tarmac
dirt, grass etc = surface values of: cobblestone, compacted, dirt, grass, gravel, ground, pebblestone, sand, unpaved

Key

— path..., grave 1, surface=paved etc
— road..., surface=paved etc
— Grade 2
— surface=compacted
— Grade 3
— Grade 4
— Grade 5
— surface=dirt, grass etc
— highway=unsurfaced — no other tag
— Other
— Not specified

Damaged houses after the gas explosion
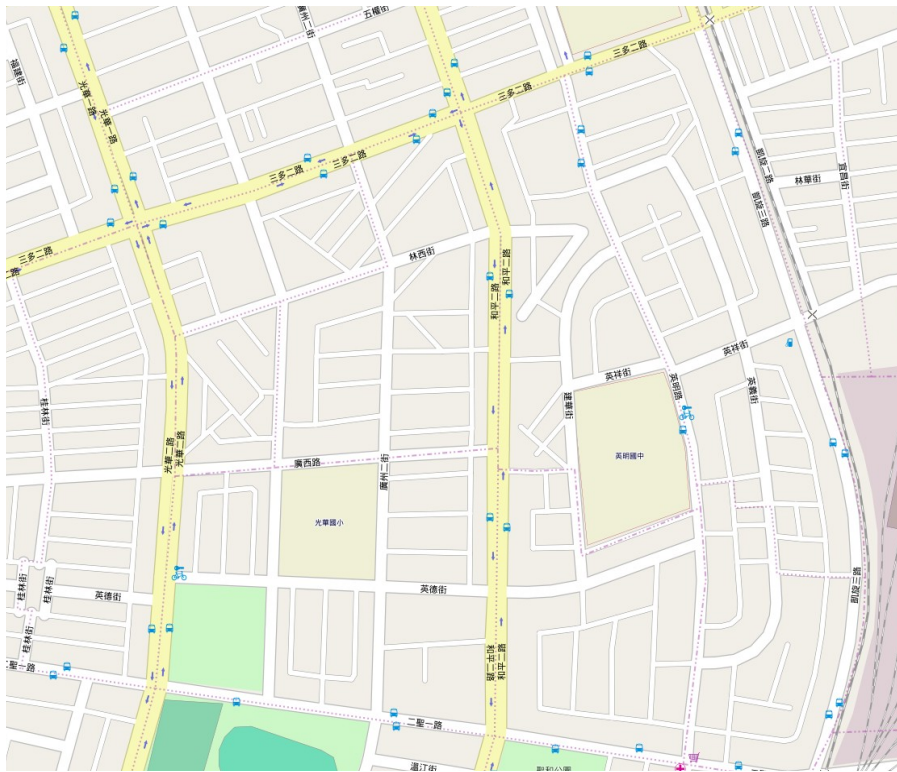
Before
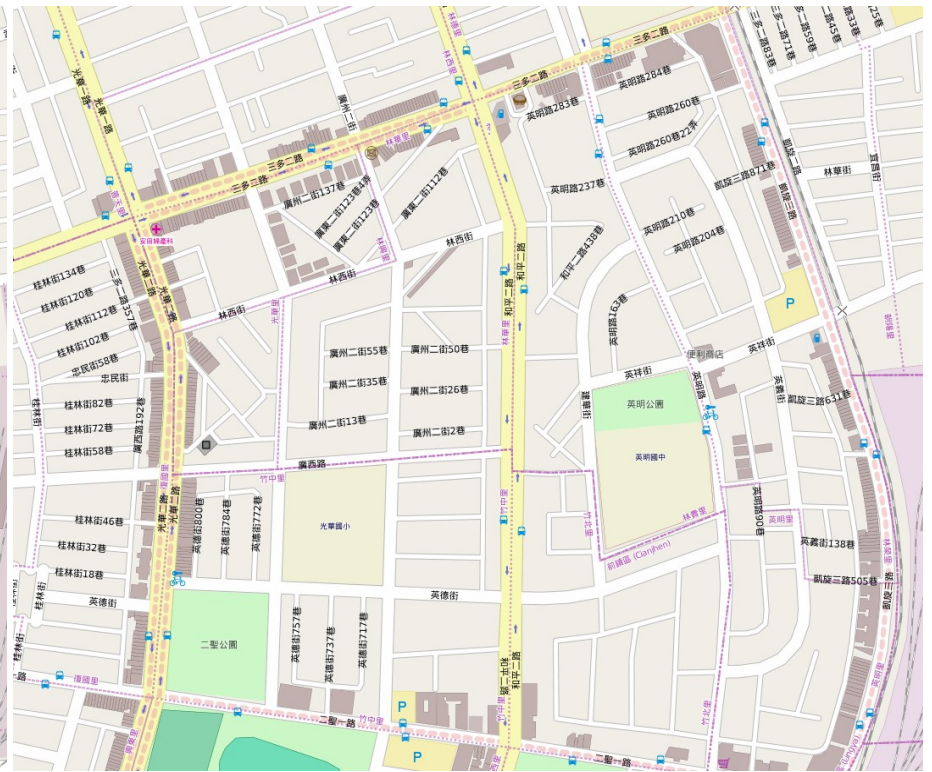
After
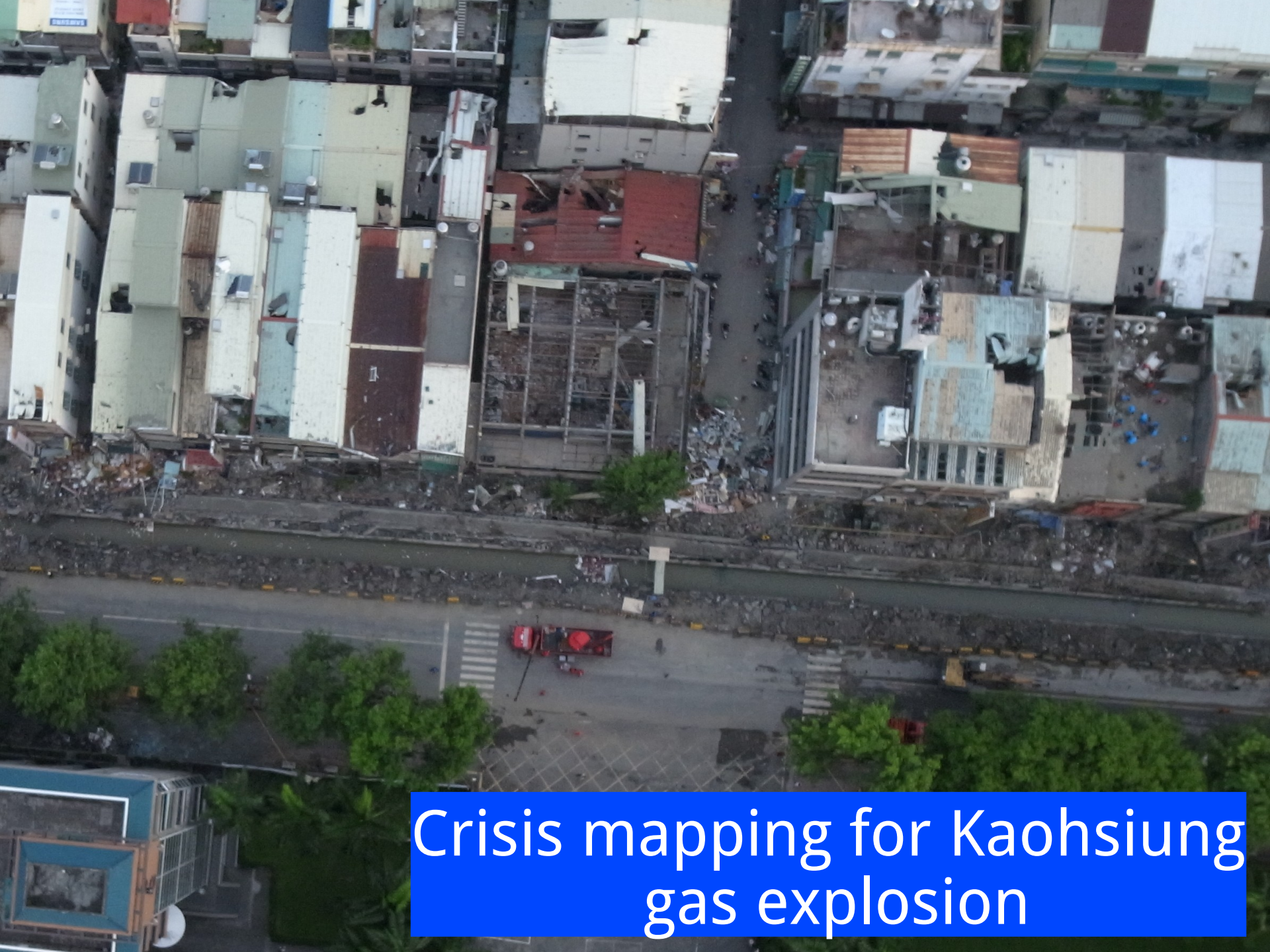
Crisis mapping for Kaohsiung gas explosion

Outline

- Introduction to OSM Taiwan
- Cache server
  - Why?
  - NCHC's capacity
  - Hardware, network
  - OS, services
  - Maintenance
- Q&A

Clonezilla

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Why? - Background

- OSC 2013 Aug Kansai@Kyoto
- No any cache server in Asia at that time
  - Long loading time
- Daniel Kastl from Georepublic asked, and mentioned:
  - "Universities here have a terrible administrative overhead with lots of formal requirements. Even community members working at universities seem to try to avoid the paperwork."
  - "Data center providers we talked to are mostly "scared" about the data traffic. In general internet speed in Japan is super fast, and traffic is unlimited for private users. But it seems the mix of "power-users" and "low-traffic" users, which makes "unlimited traffic" possible. After talking to data center providers it seemed to me, that internet traffic in fact is quite expensive in Japan. Hardware costs were not really an issue for them."

Background – network bandwidth

- The traffic is distributed by tile.openstreetmap.org using GeoDNS to pick the "local" server. In partnership with the cache provider we (OSM sysadmins) decide which countries are best served by a particular server. See: http://dns.openstreetmap.org/tile.openstreetmap.org.html for current setup.

- Traffic:
  - Using May 2012 statistics, Japan uses around 312 Kilobytes/s (inbound+outbound) of tile traffic (averaged over 7 days)
  - Peak will be around double that, low being around half.
  - The tile rendering server is based in the UK (AS786), normal cache byte hit ratio is around 80%.
  - The servers are constantly monitored, traffic is automatically redistributed if a greater than 5min outage occurs.
  - Expected growth rate is around 3% per month.

* Quoted from OSM systemadm team, provided by Daniel Kastl

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Background – network bandwidth in Sep/2013

- Traffic Estimates per country averaged over 24 hours during week:
    - Bangladesh 3.71 KBytes/s outbound
    - Cambodia 4.2 KBytes/s outbound
    - China 169.63 KBytes/s outbound
    - Hong Kong 32.14 KBytes/s outbound
    - India 322.86 KBytes/s outbound
    - Indonesia 72.06 KBytes/s outbound
    - Japan 208.28 KBytes/s outbound
    - Laos 2.31 KBytes/s outbound
    - Malaysia 23.30 KBytes/s outbound
    - Myanmar 3.50 KBytes/s outbound
    - Nepal 7.07 KBytes/s outbound
    - North Korea 0.02 KBytes/s outbound
    - Pakistan 17.01 KBytes/s outbound
    - Philippines 149.40 KBytes/s outbound
    - Singapore 50.94 KBytes/s outbound
    - South Korea 68.06 KBytes/s outbound
    - Taiwan 63.60 KBytes/s outbound
    - Vietnam 42.95 KBytes/s outbound
    - Total: 1241.129 KBytes/s outbound
- Inbound is approximately 10% of outbound.

* Quoted from OSM systemadm team, Grant Slater

OSM Tile CDN

- Tile CDN (Content Delivery Network)
- Cache isn't a file mirror, it is a proxy + caching setup
  - Not a files mirror only. Therefore the mechanism is more complicated than an open source/free software mirror site.
  - Two months in communication with OSM sysadmin team (Grant Slater).
  - We spent 4 more months to find the solution to follow the administration policy at NCHC, prepare and setup the machine.

National Center for High-Performance Computing

2008
Taichung Office
Opened

2005
Tainan Office
Opened

2003
Became Incorp
orated

1993
Hsinchu Headquarters
Opened

1991
Officially Founded

1988
Started
Planning
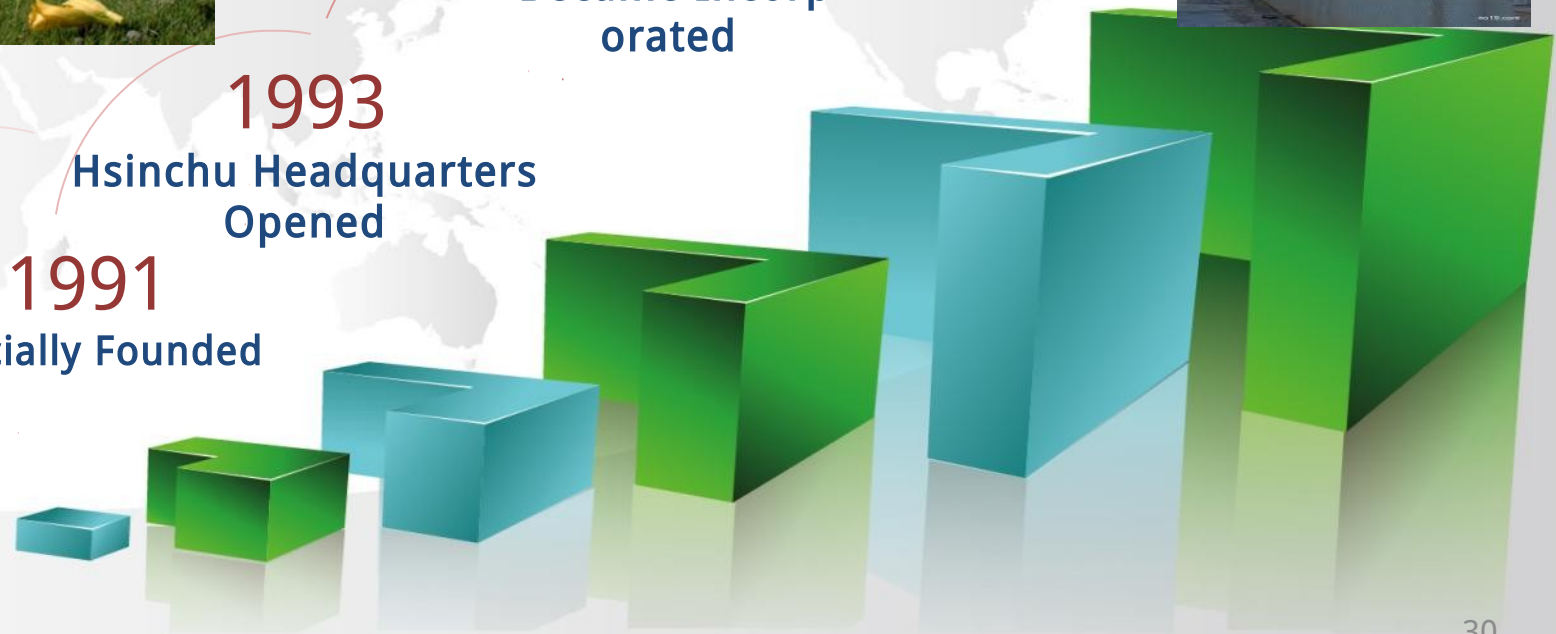
HPC Services

- **Open to academic, research, and Industrial users**
- **Supporting 700+ research projects per year**
  - **ALPS system – most recent supercomputer built in 2011**
  - **R_{max} 177 TFLOPS sustained, 442.00 MFLOPS/W**
  - **25,600 Cores   • 73,728 GB Memory   • 1,074 TB Disk**

  Jun. 2011: Top500 Ranking: No. 42 / Green500 Ranking: No. 25

御風者 WINDRIDER

Advanced Large-scale Parallel Supercluster (*ALPS*)

TOP 500
35

IBM Cluster 1350 / 19. 91TF

Formosa 5/ 89.9 TF

NCHC Total Computing Capacity

R_{max} (TF) vs Year

Year	2008	2009	2010	2011	2012	2013
R_{max} (TF)	31.7	31.7	46.9	289.4	308.9	308.9
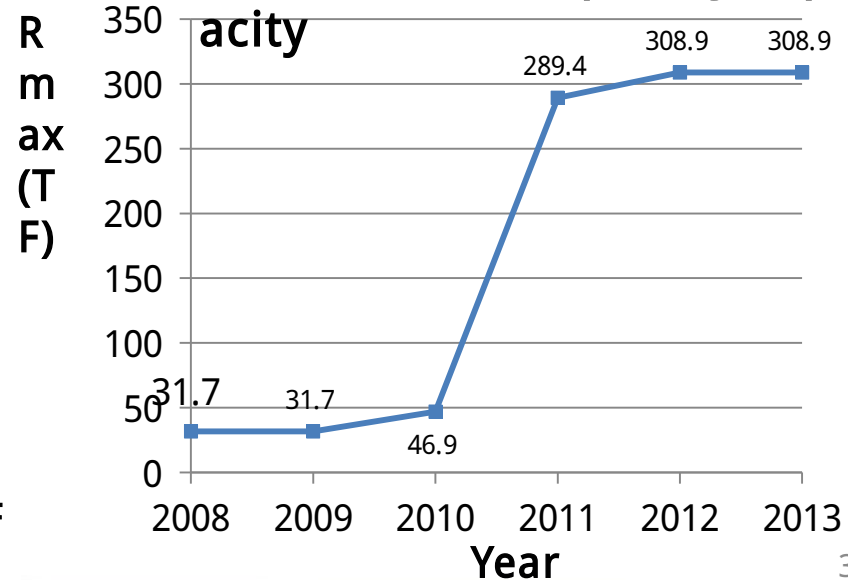
Research and Education Network

- **Providing research network, education network (T ANet), and optical lightpath services with 20 Gbps backbone**

- **Working toward 100Gbps backbone from 2013**

- **Peering with 35 IPv4 and 24 IPv6 networks world wide with 5Gbps connection**

- **Network availability rate up to 99.991%**

- **Dynamic circuit provisioning enabled**
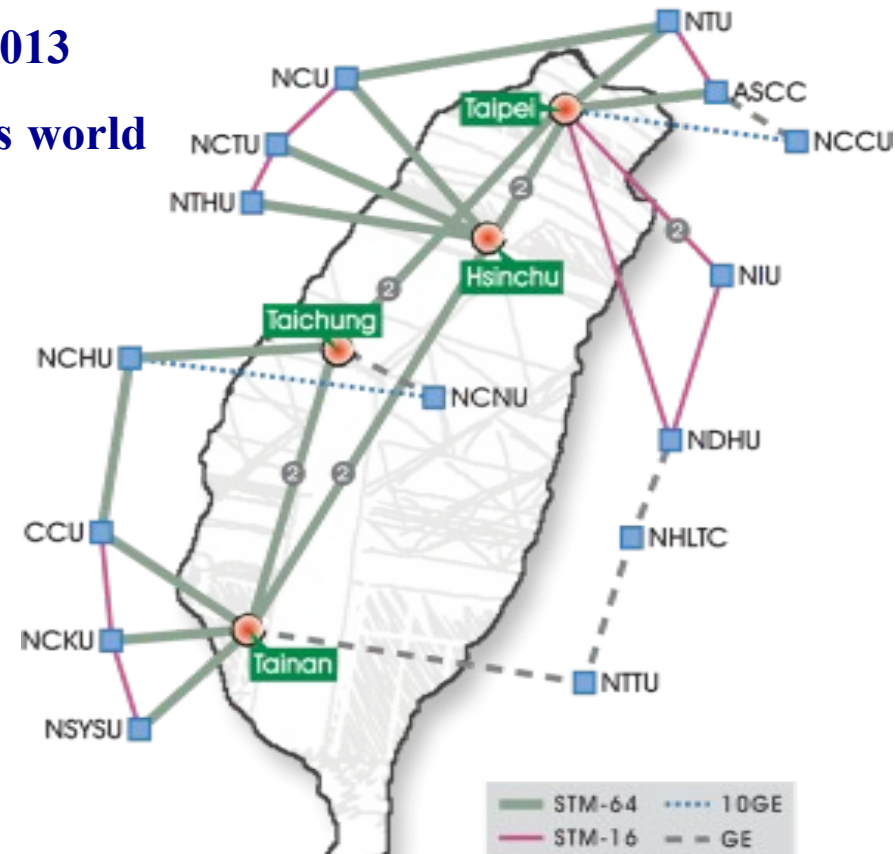
Storage Services
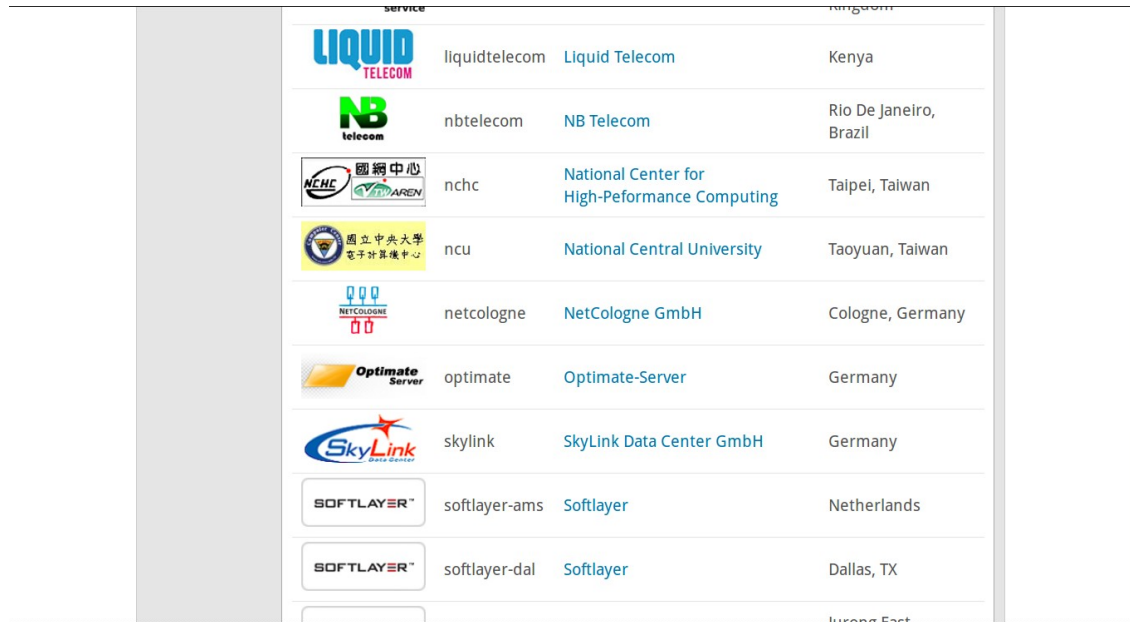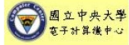
Storage Capacity

- **Three-site, 3-tier backup**

- **Total 5.4 PB Capacity**

- **Supports 30+ projects from academia and research institutes**

- **Deploys disk and tape facilities in Hsinchu, Taichung, and Tainan; Interconnected via TWAREN and Storage Area Network (SAN)**

Some mirrors@NCHC

- Sourceforge mirror site from 2005
- Major GNU/Linux distribution and OpenSource/Free Software mirrors: http://free.nchc.org.tw
  - CentOS, Debian, Fedora, Gentoo, Linux Mint, Ubuntu, OpenSuSE, VLC, Firefox...

		service		Kingdom
LIQUID TELECOM	liquidtelecom	Liquid Telecom		Kenya
NB telecom	nbtelecom	NB Telecom		Rio De Janeiro, Brazil
NCHC 國網中心 TWAREN	nchc	National Center for High-Peformance Computing		Taipei, Taiwan
國立中央大學 電子計算機中心	ncu	National Central University		Taoyuan, Taiwan
NETCOLOGNE	netcologne	NetCologne GmbH		Cologne, Germany
Optimate Server	optimate	Optimate-Server		Germany
SkyLink	skylink	SkyLink Data Center GmbH		Germany
SOFTLAYER	softlayer-ams	Softlayer		Netherlands
SOFTLAYER	softlayer-dal	Softlayer		Dallas, TX
				Jurong East

Source: http://sourceforge.net/p/forge/documentation/Mirrors/

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About us

- Free Software Lab, NCHC, Taiwan
- Developers of the free software DRBL, Clonezilla Partclone, DRBL-Winroll,and more...
- Steven is also the maintainer of GParted live CD

Clonezilla

National Center for High-Performance Computing

Better HPC Better Living
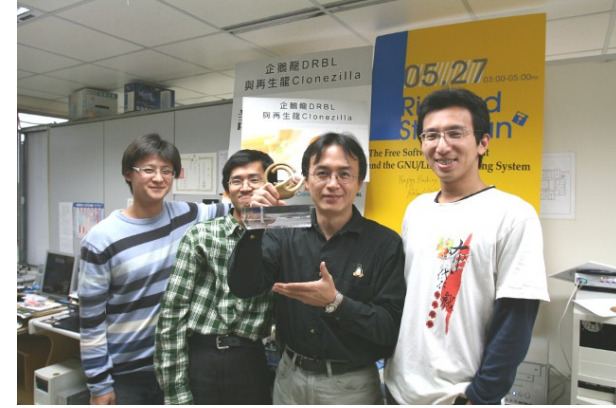
Taiwan image source: wikipedia.org

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How?

- Procedure to setup a cache server
  - 1) Install a server running Ubuntu 12.04 (AMD64)
  - 2) Create an account for OSM systemadm
  - 3) OSM systemadm logins in and setup management setup (Chef) which installs +configures everything needed.
  - 4) OSM systemadm moves a little traffic for first week and feed back to cache server owner.
- Cache server owner will have login access to machine at all times. Any shutdowns or disconnects will automatically be detected by OSM system and the server will automatically be removed from the pool.

* Quoted from OSM systemadm team, Grant Slater

Basic requirements

- http://wiki.openstreetmap.org/wiki/Servers/Tile_CDN
  - Basic regional tile delivery server requirements:
    - 16 GB RAM (at least; better 32 GB);
    - Fast network connection with high usage or unlimited traffic; (Traffic is directed by GeoDNS)
    - Full root/sudo access (Remote Management beneficial eg: HP Integrated Lights-Out);
    - Ubuntu 14.04 LTS 64-bit (AMD64);
    - Storage of at least 146GB excluding OS. (10kRPM disk or better preferred)

Tile server@NCHC Longma 龍馬

- Hardware
  - CPU: Intel Xeon CPU E5-2620 v2 @ 2.10GHz, 6 cores
  - RAM: 32 GB
  - Hard drives: 160 GB SATA disk and 400 GB SATA disk
  - Two Gigabits Ethernet cards
- OS
  - Ubuntu 12.04 LTS (2014/02-2014/12)
  - Ubuntu 14.04 LTS (2014/12-Now)
- Proxy server: Squid 2.7.STABLE9
  - OSM systemadm planned to upgrade to varnish 3.x

Source: http://design.ubuntu.com; http://www.squid-cache.org

1ˢᵗ cache server in Aisa

- On Feb/19/2014, the cache server was ready, and some test traffic was redirected
- It was until Jan/02/2015 OSM.org announced it on the blog:
- https://blog.openstreetmap.org/2015/01/02/four-new-tile-servers/

OpenStreetMap blog

LANGUAGES

🇬🇧 English

BLOGROLL

Blogs.OpenStreetMap.org

RECENT POSTS

Fundraising drive 2015

Four New Tile Servers

Have you noticed faster tiles lately? Browsing the map on openstreetmap.org should now be even more responsive. Three new servers, started providing tiles over the last 2 weeks, joining a server which started earlier in the year.

- Tile server saphira, located in London UK kindly hosted by Jump Networks.
- Tile server viserion, located in Pula Croatia, kindly hosted by CARNet.
- Tile server stormfly-02, Located in Corvallis USA, kindly hosted by OSUOSL.
- Tile server longma, Located in Hsinchu Taiwan, kindly hosted by NCHC.

Map tiles are delivered to users based on their GeoDNS location. The OpenStreetMap tile content delivery network (CDN) now supports EDNS-client-subnet to improve locating the closest region tile cache.

System Monitoring

- Munin

- http://munin.osm.org/openstreetmap/longma.openstreetmap/index.html
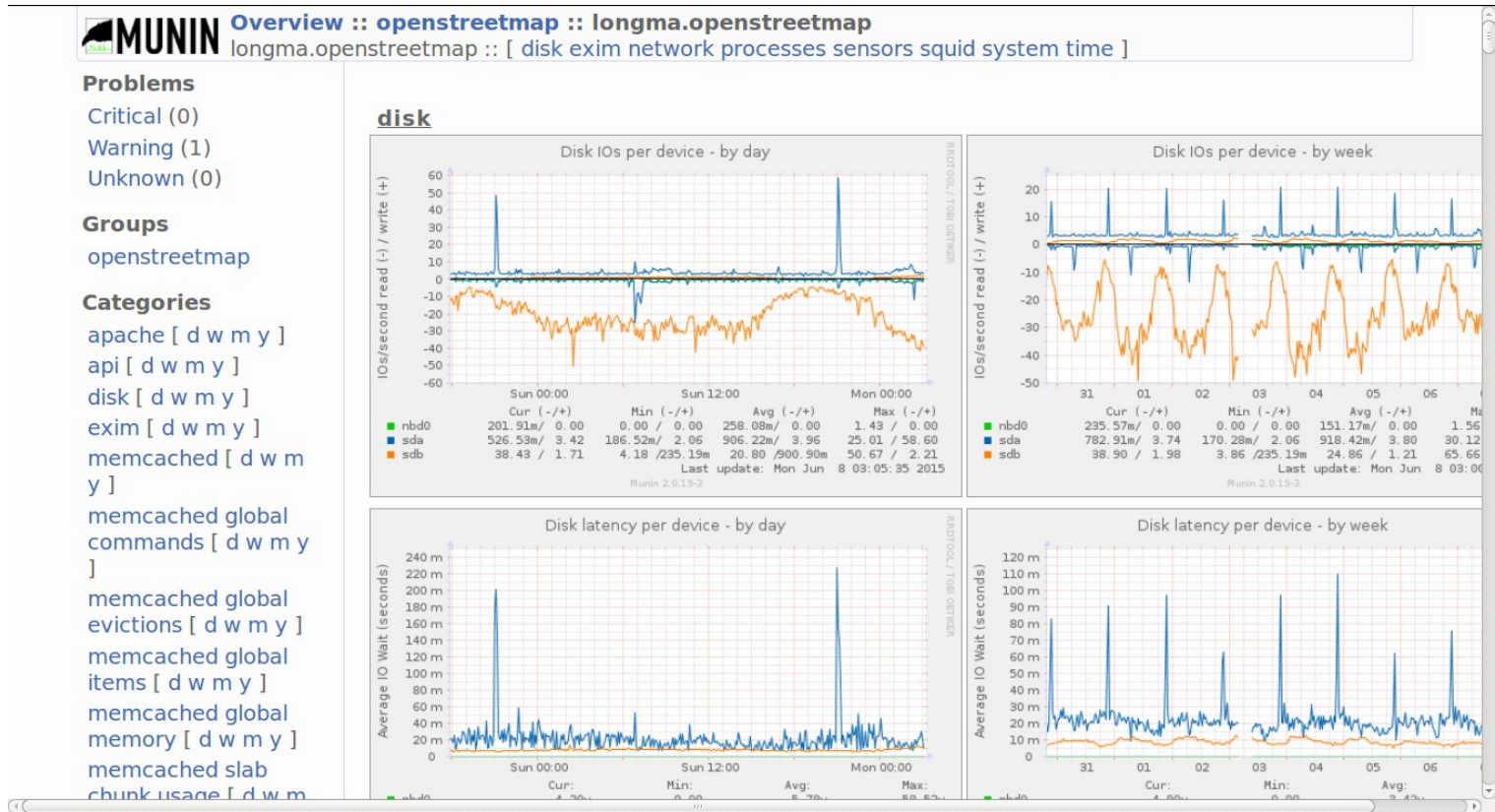
Contact with OSM Systemadm team

- Email
  - operations@osmfoundation.org
- Jabber
- IRC:
  - #osm-dev on oftc network
  - Also available via http://irc.OpenStreetMap.org

Source: (1) http://en.wikipedia.org/ (2)http://jabber.org (3) http://www.oftc.net
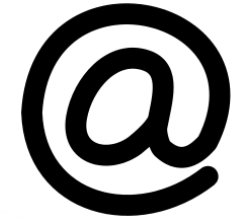
Having problems?

1. Try to fix the issue by ourselves first
2. Reboot the tile server
3. Ask OSM systemadm to solve the issue remotely

Before
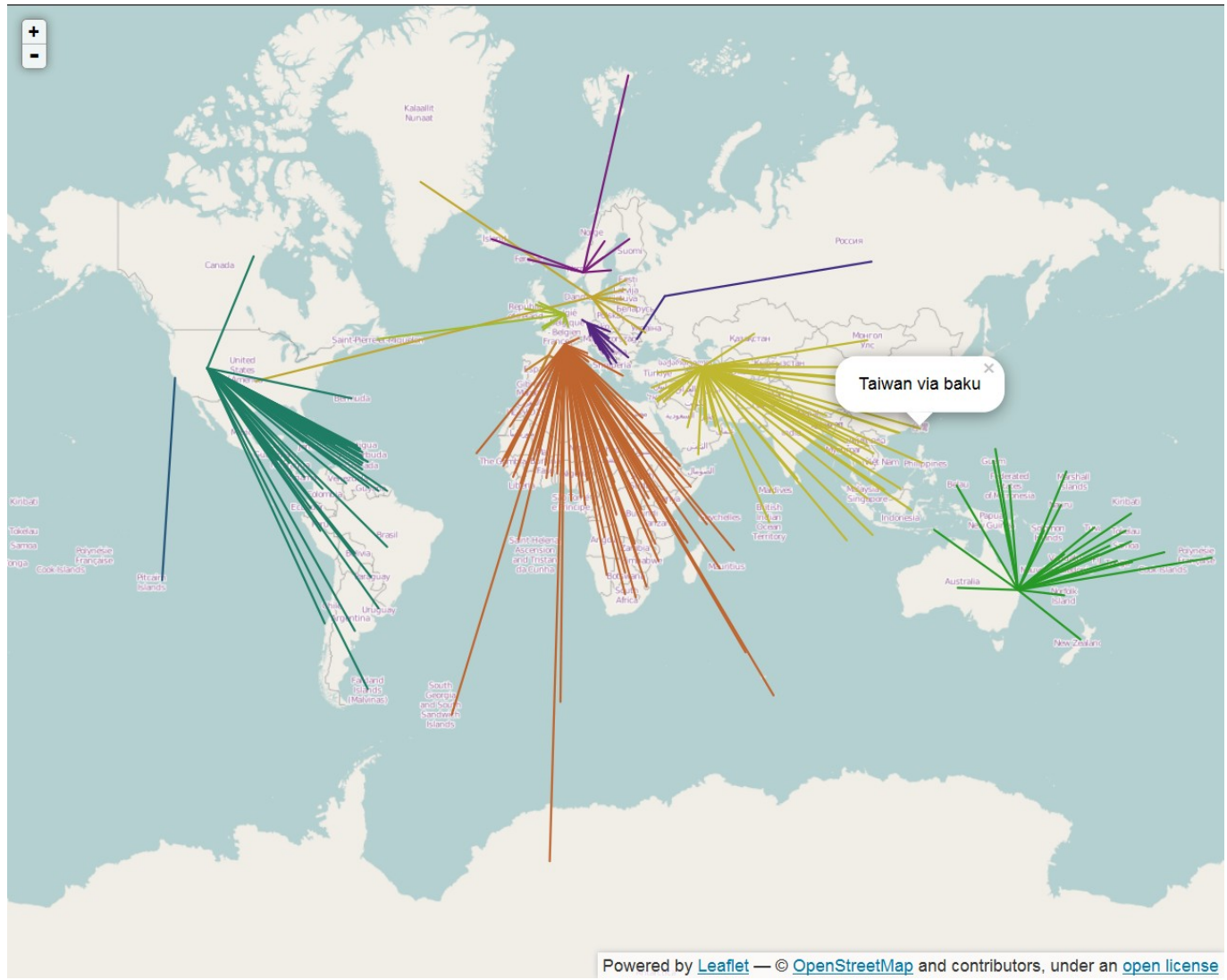
Source: http://dns.openstreetmap.org/tile.openstreetmap.org.html on 2014/Jan

After

Source: http://dns.openstreetmap.org/tile.openstreetmap.org.html on 2015/May

Longma serves 22 countries/regions
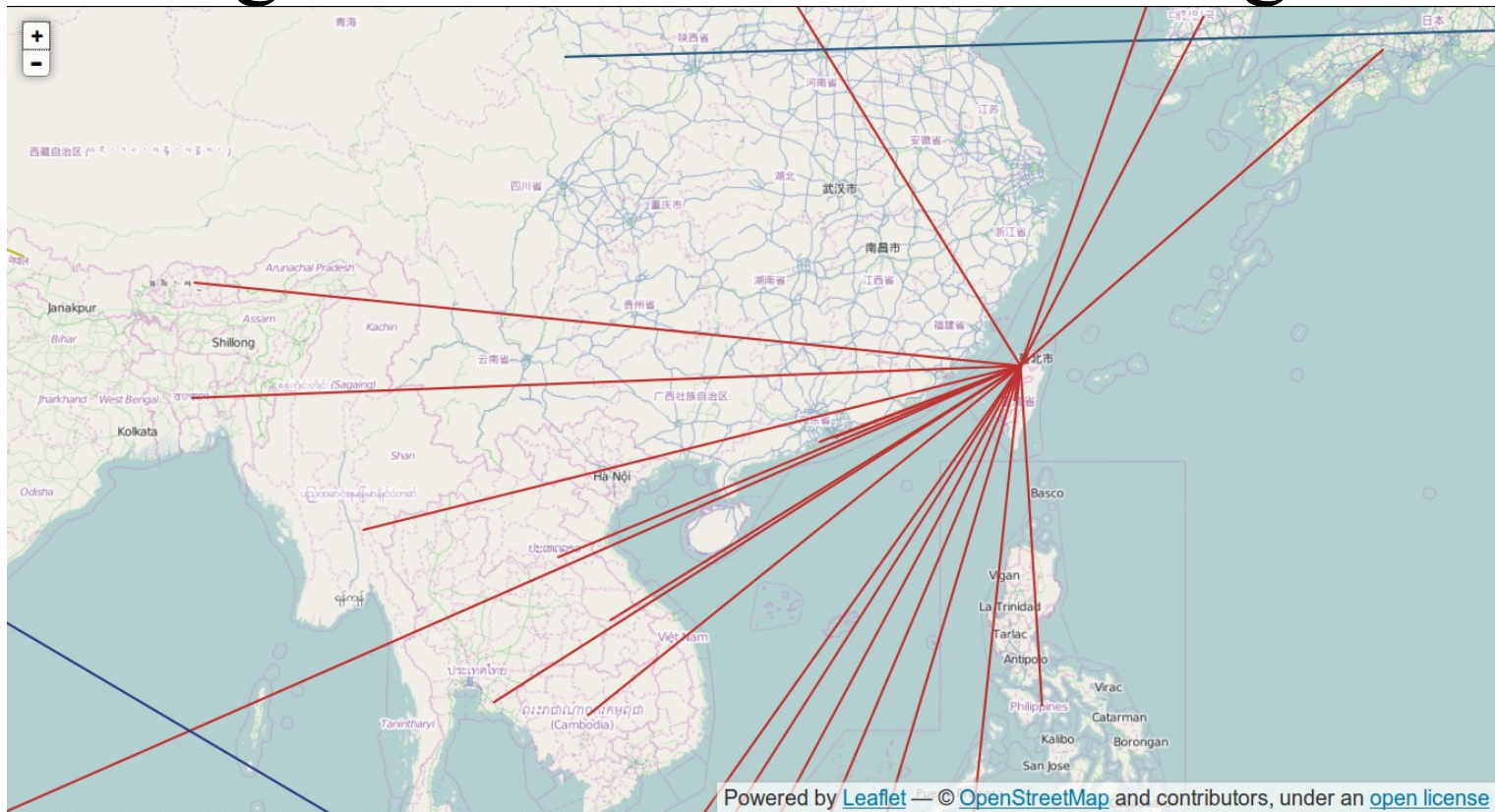
Taiwan, Japan, South Korea, North Korea, Mongolia, Bhudan, Bengal, Myanmar, Laos, Sri Lanka, Vietnam, Thailand, Macao, Hong Kong, Cambodia, Singapore, Cocos (Keeling) islands, Malaysia, Christmas island, Brunei, Indonesia, Philippines

Source: http://dns.openstreetmap.org/tile.openstreetmap.org.html on 2015/May

Stats: System loading

Load average - from Sun May 4 00:33:14 2014 to Mon Jun 8 00:33:14 2015

	Cur:	Min:	Avg:	Max:
■ load	0.31	0.01	0.24	2.06

Last update: Mon Jun 8 00:31:09 2015

Munin 2.0.19-3

Stats: CPU usage

CPU usage - from Sun May 4 00:28:14 2014 to Mon Jun 8 00:28:14 2015

	Cur:	Min:	Avg:	Max:
system	6.92	0.25	2.70	94.73
user	8.14	0.64	6.56	111.09
nice	0.08	0.00	0.02	20.22
idle	1165.48	1006.81	1177.35	1215.97
iowait	11.11	0.20	7.91	79.41
irq	0.00	0.00	0.00	0.01
softirq	3.31	0.00	2.70	10.40
steal	0.00	0.00	0.00	0.00
guest	0.00	0.00	0.00	5.97

Last update: Mon Jun 8 00:30:32 2015

Munin 2.0.19-3

6 cores + hyper threading, so there are 12 CPUs in Longma

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Stats: Memory usage

Memory usage - from Sun May 4 00:33:14 2014 to Mon Jun 8 00:33:14 2015

	Cur:	Min:	Avg:	Max:
apps	23.44G	351.43M	19.49G	23.71G
page_tables	54.14M	4.36M	41.92M	55.99M
swap_cache	25.35M	0.00	14.01M	234.57M
slab_cache	407.17M	107.99M	457.97M	603.87M
cache	7.18G	5.15G	11.10G	29.73G
buffers	17.75M	3.70M	20.78M	252.21M
unused	288.91M	215.82M	284.93M	18.47G
swap	107.88M	0.00	32.66M	349.07M
vmalloc_used	334.18M	326.20M	330.87M	340.42M
committed	23.79G	377.25M	19.55G	24.12G
mapped	4.07G	8.79M	399.38M	4.10G
active	20.46G	447.85M	22.31G	23.15G
inactive	5.91G	4.83G	7.70G	30.13G

Last update: Mon Jun 8 00:30:23 2015

Munin 2.0.19-3

Stats: Network traffic

eth0 traffic - from Sun May 4 05:13:12 2014 to Mon Jun 8 05:13:12 2015

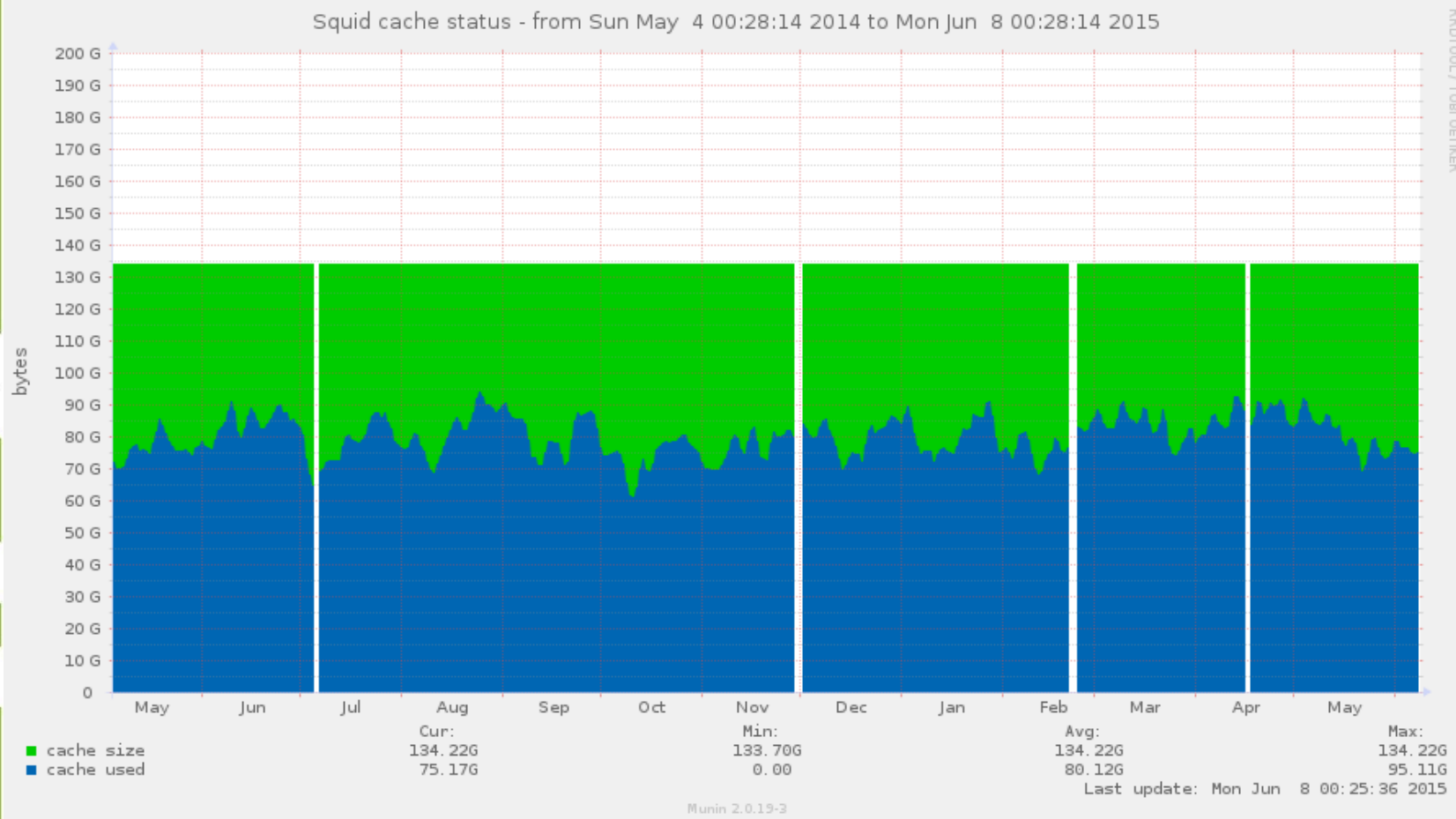|	Cur (-/+)	Min (-/+)	Avg (-/+)	Max (-/+)
bps	2.68M/ 10.42M	1.50k/ 1.72k	2.80M/ 8.73M	52.40M/ 35.62M

Last update: Mon Jun 8 05:16:01 2015

Average is about 8.7 Mbps (out) / 2.8 Mbps (in)
~0.17% (out)/0.06% (in) of NCHC's total bandwidth
Throughput: 2.8 TB/month (out) / 0.9 TB/month (in)
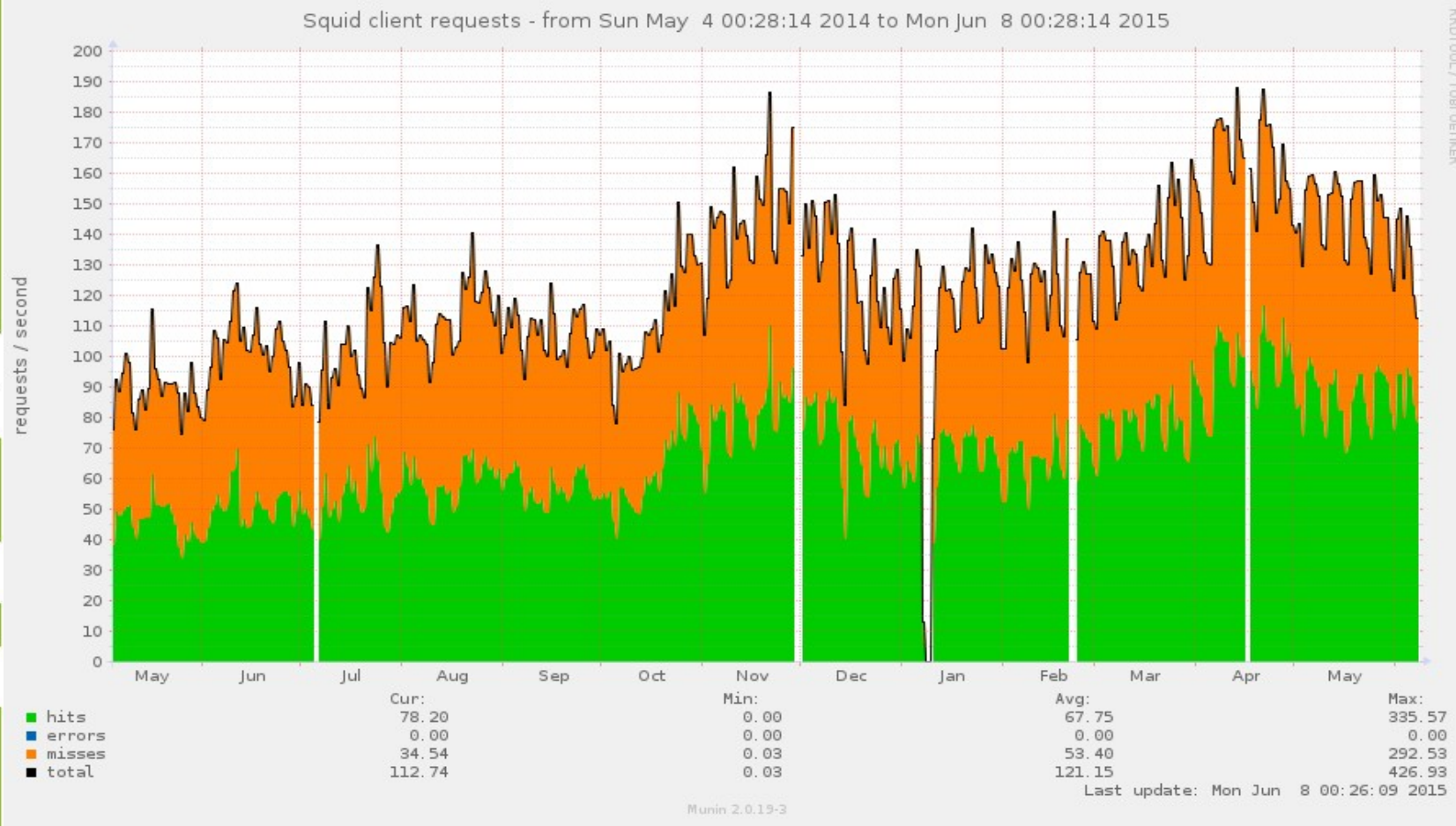*There was a firewall configuration issue at NCHC in early Jan 2015
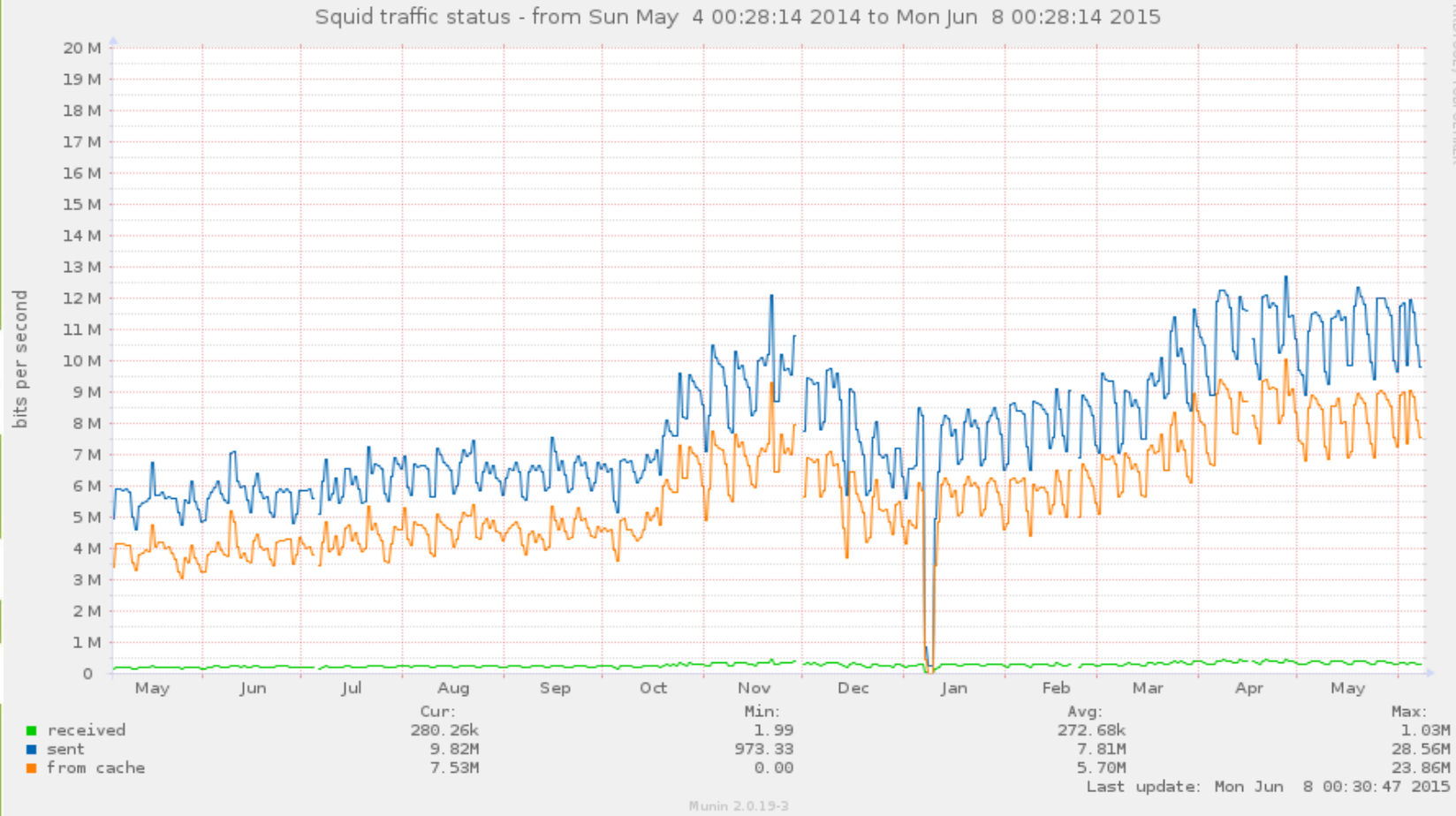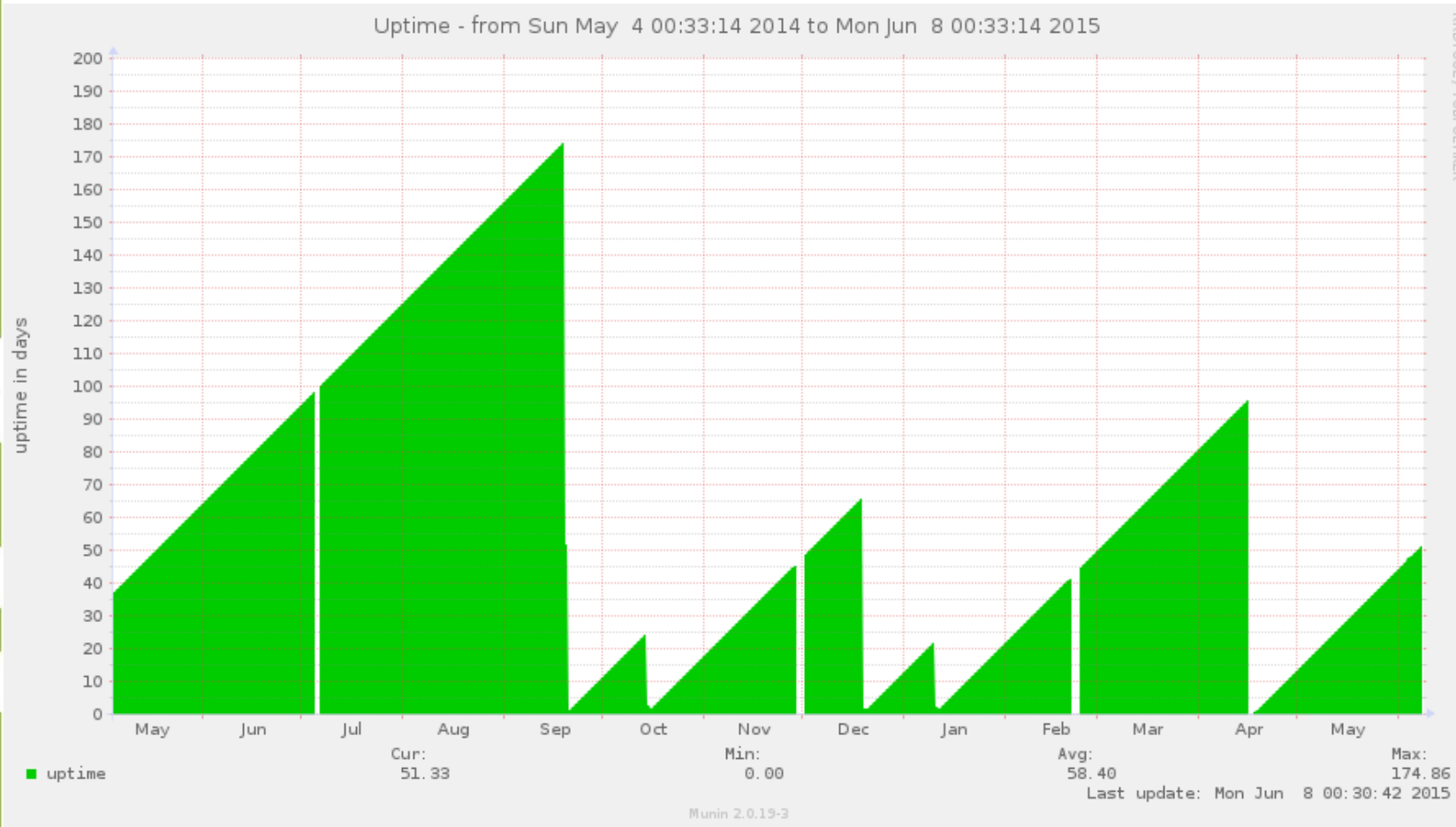
49

Stats: Squid cache

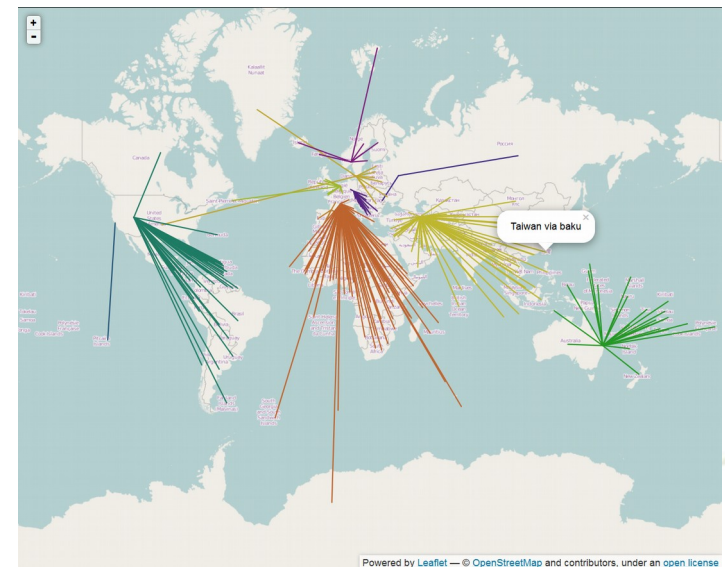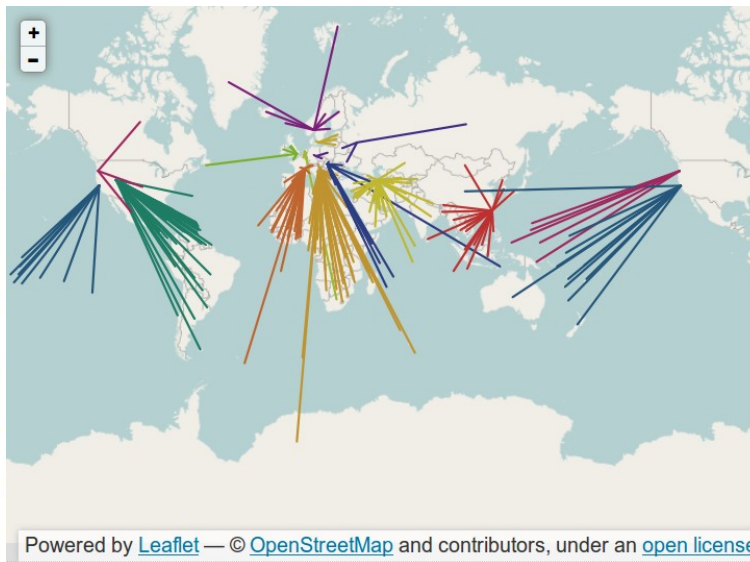# Stats: Squid client requests

Stats: Squid traffic

Stats: System uptime

But we are still alone in Asia...

- Asian users need more cache servers
- Each other as a redundant server

Conclusions

- OpenStreetMap systemadm team has a very good mechanism to setup and monitor the tile server. Therefore the efforts we spend on the system maintenance is minimum.

- More cache servers are needed in Asia. The redundant mechanism has to be established.

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Acknowledgement

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Reference

- OpenStreetMap: http://www.openstreetmap.org
- OpenStreetMap Taiwan: http://openstreetmap.tw
- Academia Sinica: http://www.sinica.edu.tw
- NCHC: http://www.nchc.org.tw
- OSM Munin: http://openstreetmap.tw
- DRBL: http://drbl.org
- Clonezilla: http://clonezilla.org
- Gparted: http://gparted.org

TAIWAN www.nchc.org.tw NCHC

Questions ?