

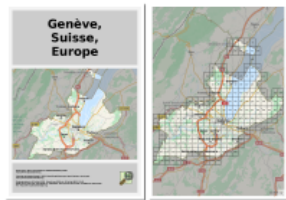
MapOSMatic, free city maps for everyone!

Thomas Petazzoni

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Libre Software Meeting 2012

<http://www.maposmatic.org>



Thomas Petazzoni

- **Embedded Linux engineer** and trainer at Free Electrons
- Regular contributor to the **Buildroot** project, an open-source embedded Linux build system
- Contributor to the Linux **kernel**
- Active in the free software community: founder of *Toulibre*, founder of the *Agenda du Libre*
- **One of the developer of MapOSMatic**, together with David Decotigny, Gaël Utard, Maxime Petazzoni, David Mentré, Frédéric Lehobey, Étienne Loks, and many other contributors.

Agenda

- ① Original idea and goal
- ② History
- ③ Current status
- ④ Technical details
- ⑤ Future

Original idea

At some point in 2009...

*“It would be great to be able to use
OpenStreetMap data to generate city maps
such as the ones we can see in town signs and
in folded maps.”*

Gilles Lamiral, OSM contributor of Bretagne, France

Public city maps



Folded maps



Goal

Create an **easy-to-use Web service**, in which the user inputs the **name of a city**, and in return gets:

- ① a **map** of that city, overlaid by a **grid**
- ② an **index of streets and amenities** associated to the map

Development model

- The development mainly takes place during **hackfests**
- Hackfests are gathering of 4-6 developers for 2 to 8 days, fully dedicated to making progress on the project
- Hackfests provide an excellent productivity
- Maintenance and minor progress (bug fixes, translation updates) done outside of the hackfests, as a regular open-source project, with mailing-list, Git repositories, etc.

Hackfest #0

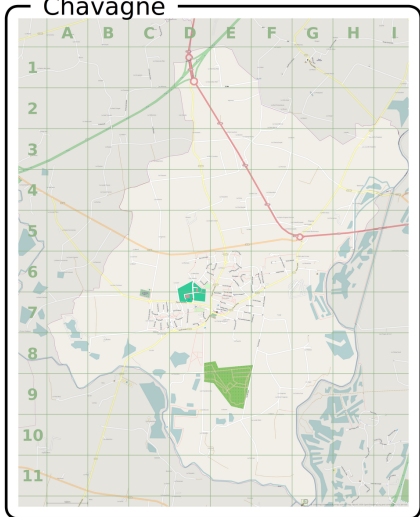
- August 2009, Toulouse, France
- Six OSM contributors
- **No knowledge** of PostgreSQL, PostGIS, Mapnik, OSM data structure, Cairo
- Initial version of MapOSMatic **developed and published in 7 days**
 - Technologies: Python, Django, Cairo, PostgreSQL, PostGIS, Mapnik
- Limited to France, no support for languages other than French and English, very basic user interface, OSM data never updated
- <http://www.maposmatic.org>



Excellent reception from the OpenStreetMap community

Hackfest #0 results

Chavagne



Chavagne

A			H		
Ajoncs (Allée des)	F6	Hoëdic (Rue d')	D7		
Alfred de Musset (Rue)	D-E6	Houat (Rue d')	D7		
Arz (Rue d')	C7				
B			J		
Aubépines (Allée des)	F6	Joseph Tirel (Rue)	F7		
Aubiers (Rue des)	E-F7				
Avenir (Rue de L')	E7...G6				
C			L		
Belle île (Rue de)		Lamartine (Rue)	D-E6		
Berder (Rue de)	C7	Louird (Allée de)	D7		
Blanchardière (Rue de la)	E-F7	Louis Aragon (Rue)	D-E6		
Bosquet (Rue du)	F-G6				
D			M		
Boulay (Rue du)	E-F7	Madame de Sévigné (Allée)	D6		
Bréhat (Rue de)	D7	Mail (Avenue du)	E6...F7		
Bretagne (Avenue de)	C-D7	Mairie (Avenue de la)	E7		
		Mairie (Place de la)	E7		
E			O		
Calvaire (Rond-Point du)	D7	Molène (Rue de)	D7		
Calvaire (Rue du)	D-E7	Montrichard (Rue)	D7		
Cézembre (Rue de)	D7				
F			P		
Champ Fleuri (Rond-Point du)	C7	Ouessant (Rue d')	D7		
Champ Fleuri (Rue du)	C-E7				
Chateaubriand (Rue)	D6	Parc (Rue du)	E7		
Chemin Vert (Allée du)	F6	Paul Eluard (Allée)	D-E6		
Chêne (Rue du)	E7	Paul Verlaire (Allée)	E6		
Clairière (Impasse de la)	E6	petite Fontaine (Rue de la)	E6		
Clos Marguerite (Impasse du)	D-E7	Petite Fontaine (Rue de la)	E6		
Closures (Chemin des)	C7	Plaine (Place de la)	E6		
Croix Blanche (Chemin de la)	D7	Plessis (Rond-Point du)	E6		
Croix verte (Rue de la)	E5-7	Plessis (Rue du)	E-F6		
		pommiers (Impasse des)	E6		
G			R		
Domaine (Rue du)	E6-7	Pommiers (Impasse des)	E6		
		Pree (Allée de la)	D7		
H			S		
Ecu (Passage de l')	E7	Rotonde (Avenue de la)	E7		
Egacé (Rue de l')	E9...F9				
Église (Place de l')	E7	Sablières (Rue des)	E6-7		
Épine (Rue de l')	E7	Saint Martin (Rue)	E7		
Espérance (Avenue de l')	E7	Sein (Rue de)	C7		
Etoile (Place de L')	E6-7	Sept îles (Rue des)	D7		
I			T		
Fer à Cheval (Rue du)	E5-6	Touche (Chemin de la)	E7-8		
Fontenelles (Avenue des)	F6	Turgé (Rue de)	E-F7		
Fontenelles (Impasse des)	F7				
Fontenelles (Rue des)	F6-7				
J			V		
Gautier (Clos)	D6	Verger (Allée du)	D7		
Gavrinis (Rue de)	C7	Victor Hugo (Rue)	D-E6		
Genêts (Allée des)	F6	Vieux Chênes (Rue des)	F6		
Glenan (Rue de)	C7	Vieux Cours (Rue du)	E7		
Groix (Rue de)	C-D7	Villeneuve (Rond-Point de)	G5		

Hackfest #0 details



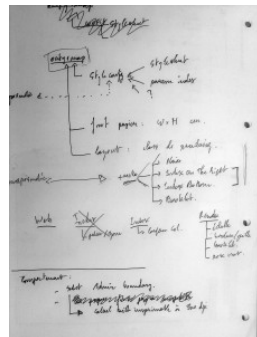
A	
Ajoncs (Allée des)	F6
Alfred de Musset (Rue)	D-E6
Arz (Rue d')	C7
Aubépines (Allée des)	F6
Aubiers (Rue des)	E-F7
Avenir (Rue de L')	E7...G6
B	
Belle Île (Rue de)	C7
Berder (Rue de)	C7
Blanchardière (Rue de la)	E-F7
Bosquet (Rue du)	F-G6
Boulay (Rue du)	E-F7
Bréhat (Rue de)	D7
Bretagne (Avenue de)	C-D7

Hackfest #1

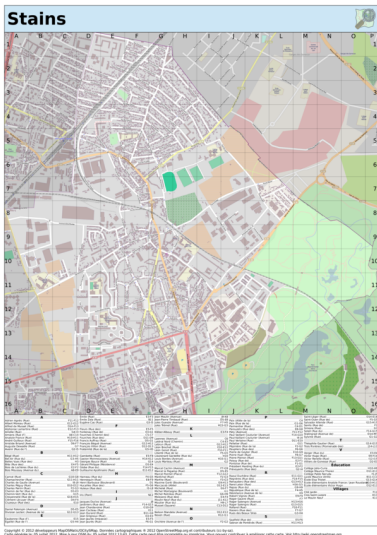
- December 2009, near Paris, France
- Five developers, four days
- Features implemented
 - Coverage of the **whole world**: required a much larger import of OSM data
 - OSM database updated on a **daily basis**
 - **i18 infrastructure** to adapt the street index generation on a per-language basis
 - City name search based on Nominatim
 - **Amenities** (schools, town hall, post offices) in the index
- All improvements put in production early January 2010
- After this hackfest, we started receiving a lot of contributions to translate the language and the street index rendering logic.

Hackfest #2

- August 2010, Toulouse, France
- Six developers, seven days
- Features
 - Complete rewrite of the rendering engine
 - Support **multiple layouts** (index on the same side as the map, at the bottom or on the side)
 - Selectable **standard paper sizes**
 - Support for **multiple stylesheets** (style of renderings)
 - Major rewrite of the web interface, to provide a **wizard for the map creation**
- Features implemented, but lack of polishing, so **no delivery in production** at the end of the hackfest...



Hackfest #2 result



Server migration, october 2010

- Our initial server, having 250 GB of hard disk space, was completely filled with the OpenStreetMap database.
- Had to migrate all our services on different machines, causing a severe downtime for the service.

Hackfest #3

- February 2012, San Francisco, USA
- Four developers, two days
- Things done
 - Investigation of a Mapnik rendering bug that was a block for releasing in production our new version
 - Add some monitoring tools on our servers
 - Polish web interface details
- Improvements made in August 2010 were still not in production!

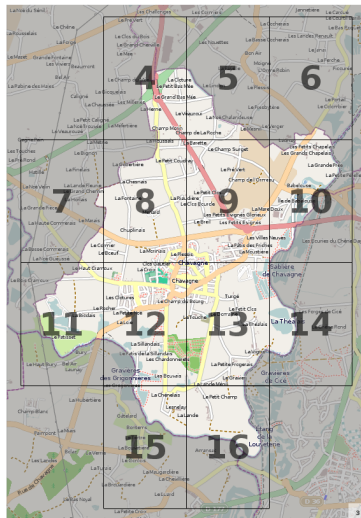
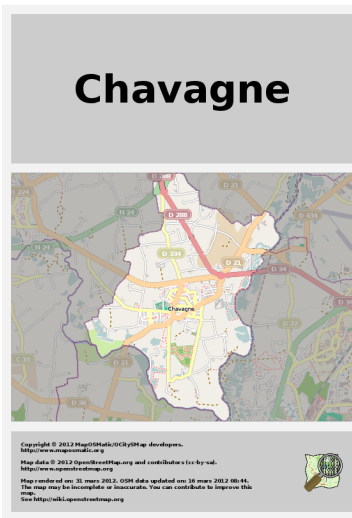


Hackfest #4

- March 2012, Rennes, France
- Five developers, seven days
- Objective: put in production all the new features
 - Support for multi-page maps, which allows to render large maps on A4 and A5 paper sizes
 - Integration of several Mapnik stylesheets
 - Many, many fixes in the rendering engine and the web interface
- **On April, 19th, a few weeks after the hackfest, we managed to put all the improvements in production and make it public!**



Hackfest #4 results



Hackfest #4 results



Hackfest #4 results

C	Calvaire (Rond-Point du) 12, D3	îles (Rond-Point des) 12, B2
	Calvaire (Rue du) 12, C3-E2	J
	Centre (Rue du) 12, D2-E2	Joseph Tirel (Rue) 13, B2-B3
	Cézembre (Rue de) 12, C2	L
	Champ Fleuri (Rond-Point du) 12, A2-B2	Louird (Allée de) 12, D2-D3
	Champ Fleuri (Rue du) 12, B2-D2	Louis Aragon (Rue) 8, C7-E7
	Chateaubriand (Rue) 12, D1	M
	Chemin Vert (Allée du) 9, B7-B8	Madame de Sévigné (Allée) 8, D7
	13, B1	Mail (Avenue du) 9, B7-B8
	Chêne (Rue du) 13, A2-A3	13, B1
	Clairière (Impasse de la) 9, A8	Mairie (Avenue de la) 12, E2
	13, A1	13, A2
	Clos Marguerite (Impasse du) 12, D2	Mairie (Place de la) 12, E2
	Clotures (Chemin des) 12, A2-A3	Margot (Impasse) 9, C7-D7
	Croix Blanche (Chemin de la) 12, C2-C3	Molène (Rue de) 12, B3-C2
	Croix Verte (Rue de la) 8, E6-E8	Montrichard (Rue) 12, D2-D3
	12, D2-E1	O
		Ouessant (Rue d') 12, B2-C2
		P
		Parc (Rue du) 12, D2-E2
		13, A2
		Paul Éluard (Allée) 8, D7
		Paul Verlaine (Allée) 8, E7
		Petite Fontaine (Rue) 13, A1-B1

Using maposmatic.org (1/11)

MapOSMatic

Your free city maps!

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English

Introduction

MapOSMatic is a free software web service that allows you to generate maps of cities using [OpenStreetMap](#) data. MapOSMatic can generate two kinds of maps:

- Single page posters, where the map and the street index are rendered side by side. The map itself is split in squares so that streets are easy to find. This format is typically useful for printing on large paper sheets.
- Multiple page booklets, where the map and the street index are split into several pages. This format is typically useful for printing on standard paper sheets.

The generated maps are available in PNG, PDF and SVG formats and are ready to be printed.

As the data used to generate maps is coming from [OpenStreetMap](#), you can freely (under the [terms of OpenStreetMap license](#)) reuse, sell, modify, ... the generated maps.



[Create a map](#)

[Find map](#)

[More details](#)

Connecté à [www.paypalobjects.com...](#)

Chavagne



City map
PDF


Donate to MapOSMatic

PayPal — The safer, easier way to pay online. You can donate to help us improve the service. See our [donation](#) page.

OSM database status

Lag of MapOSMatic OSM database: 2 hours, 6 minutes.

Random map



Donation Sites

Latest news

- [MapOSMatic talk at the Libre Software Meeting](#)
published 5 days, 13 hours ago
- [New version of MapOSMatic available!](#)
published 2 months, 2 weeks ago
- [End of March 2012 MapOSMatic](#)

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Generate your own map

1. Location 2. Title 3. Layout 4. Stylesheet 5. Paper size 6. Language 7. Summary

Geographic area selection

To select the city to be rendered, two modes are available:

- Administrative boundary
- Bounding box

-  Genève, Suisse, Europe
-  Genève, Suisse
-  Genève, Millau, Aveyron, Midi-Pyrénées, France
-  Geneve, France

Wondering why you can't choose some of these results?
Their administrative boundaries are missing from the OSM database.
Look at the [FAQ](#) for more details.

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Generate your own map

1. Location 2. **Title** 3. Layout 4. Stylesheet 5. Paper size 6. Language 7. Summary

Map title



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Layout



- Full-page layout with the street index at the bottom
- Full-page layout with the street index on the side
- Full-page layout without street index
- Multi-page layout



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Generate your own map

1. Location 2. Title 3. Layout 4. **Stylesheet** 5. Paper size 6. Language 7. Summary

Stylesheet



- The default OpenStreetMap.org style
- The *MapQuest (EU)* stylesheet
- The *MapQuest (US)* stylesheet
- The *MapQuest (UK)* stylesheet
- The *MapOSMatic printable* stylesheet



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Generate your own map

1. Location 2. Title 3. Layout 4. Stylesheet 5. Paper size 6. Language 7. Summary

Paper



- A5 (14.8 × 21.0 cm²)
- A4 (21.0 × 29.7 cm²)
- US letter (21.6 × 27.9 cm²)

- Portrait
- Landscape



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Generate your own map

1. Location 2. Title 3. Layout 4. Stylesheet 5. Paper size 6. Language 7. Summary

Language



Map Index Language: Suisse (FR)



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Generate your own map

1. Location 2. Title 3. Layout 4. Stylesheet 5. Paper size 6. Language 7. Summary

Summary:




Location: Genève, Suisse, Europe ([OpenStreetMap](#))
Title: Genève, Suisse, Europe
Layout: Multi-page layout
Paper size: A4 (21.0 × 29.7 cm²)
Stylesheet: The MapQuest (EU) stylesheet
Language: Suisse (FR)

Generate

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Genève, Suisse, Europe



Rendering: Cancel request

Rendering submitted Thursday 05 Jul 2012, 21:51:22.
In queue, position 1.

» [Refresh the status](#) (the page will refresh automatically every 10 seconds until the rendering is completed).

Using maposmatic.org (10/11)

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Genève, Suisse, Europe



Rendering:

Rendering submitted Thursday 05 Jul 2012, 21:51:22.
Rendering in progress...

» [Refresh the status](#) (the page will refresh automatically every 20 seconds until the rendering is completed).

Using maposmatic.org (11/11)

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Genève, Suisse, Europe

Recreate map



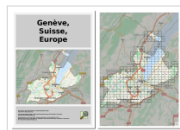
Rendering:

Rendering submitted Thursday 05 Jul 2012, 21:51:22.
Completed on Thursday 05 Jul 2012, 22:04:00 (rendering took 12 minutes).

Files:

- Map: [PDF \(198.2 MB\)](#).

[View on OpenStreetMap](#)



OSM Database (1/2)

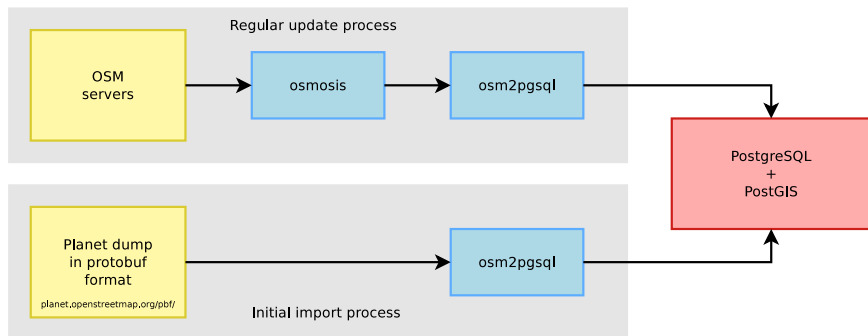
- In order to render maps, Mapnik needs an OSM database converted in a PostGIS schema
- The format of the main OSM database is different, to allow flexible tags: the conversion process is non-trivial
- **Initial import**
 - Planet dumps available in a protobuf-encoded format, at <http://planet.openstreetmap.org/pbf/>
 - Converted to the PostGIS schema and pushed into a PostgreSQL database by the *osm2pgsql* tool, <http://wiki.openstreetmap.org/wiki/0sm2pgsql>
 - Takes 8-10 days on a 6x4 cores Xeon X5670 @ 2.93 Ghz, 24 GB of RAM, a single hard drive
 - Initial file 16 GB, resulting database around 250 GB

OSM Database (2/2)

- **Regular updates**

- Minutely updates available. At MapOSMatic, we group them by slots of 15 minutes.
 - Generated using the *osmosis* tool, from the `http://planet.openstreetmap.org/redaction-period/minute-replicate/server`
 - `http://wiki.openstreetmap.org/wiki/0smosis`
 - Applied to the PostgreSQL database using *osm2pgsql*
 - Very hard to keep updated: time to apply a 15 minutes update is often around 10 minutes
- Need to buy a SSD drive.

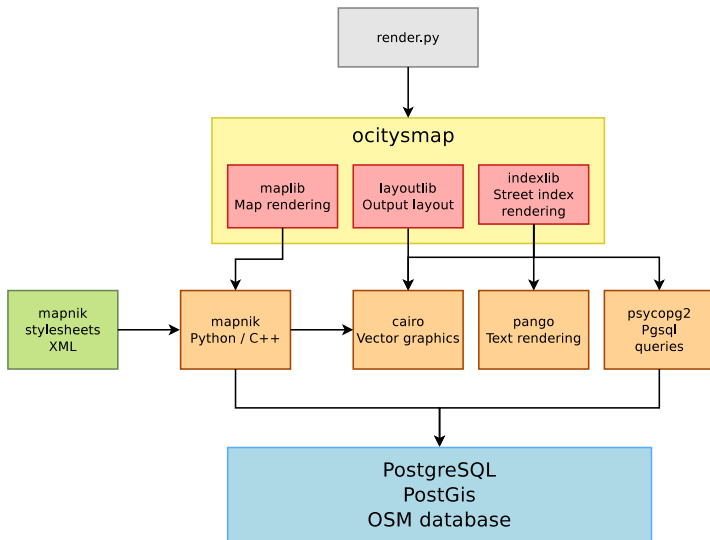
OSM Database diagram



OCitySMap

- OCitySMap is a Python module that implements the map and street index rendering
- A command-line client is provided
- Uses multiple Python modules:
 - **psycopg2** for direct PostgreSQL queries used to build the index of streets and amenities
 - **mapnik** to do the map rendering
 - **pango** to do the text rendering
 - **cairo** to layout the map and index
 - **ogr** for shapes manipulation
- Available as a separate project from MapOSMatic

OCitySMap architecture



OCitySMap example usage

Render an administrative boundary, knowing its OSM id:

```
./render.py -t "Chevreuse" -f pdf -s mapquest_eu \  
            -L fr_FR -l multi_page --paper-format A4 \  
            --osmid=-943886
```

Render a geographic area, knowing its bounding box:

```
./render.py -t "Map Title" \  
            -b 48.7268,1.9946 48.6801,2.0742
```

OCitySMap installation in a nutshell

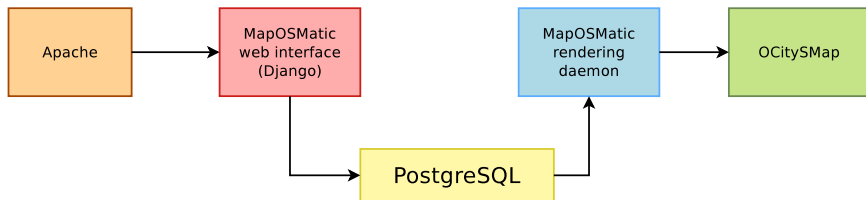
- 1 Install PostgreSQL and PostGIS, create a PostgreSQL user and database
- 2 Enable PostGIS in the database
- 3 Build and install *osm2pgsql*
- 4 Download and import the OSM data with *osm2pgsql*
- 5 Install Mapnik
- 6 Install Mapnik-OSM, the official OpenStreetMap stylesheet for Mapnik. Requires downloading of coast line data and fonts.
- 7 Installation and configuration of OCitySMap

Fortunately, everything is documented in details in the `INSTALL` file of the project.

MapOSMatic

MapOSMatic is composed of:

- 1 **A Web interface**, written using the Django framework. This interface allows user to create new maps, view existing maps, etc. When a new map is requested, it is put into a rendering queue.
- 2 **A daemon**, which processes the jobs in the rendering queue one by one. This daemon uses *OCitySMap* to do the rendering.

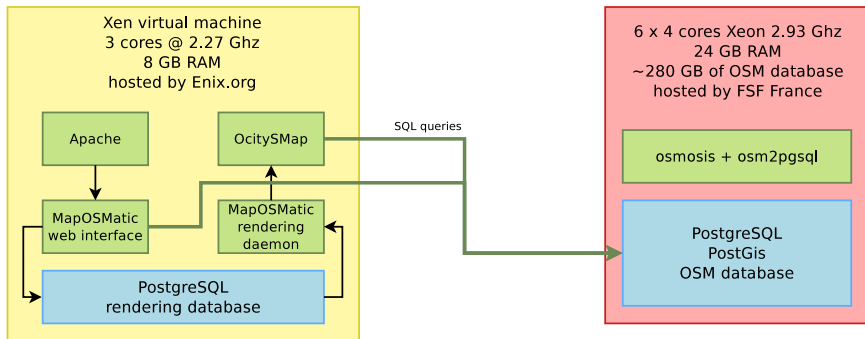


Languages

Both the website and the street index logic requires translations. So far, we have translations in:

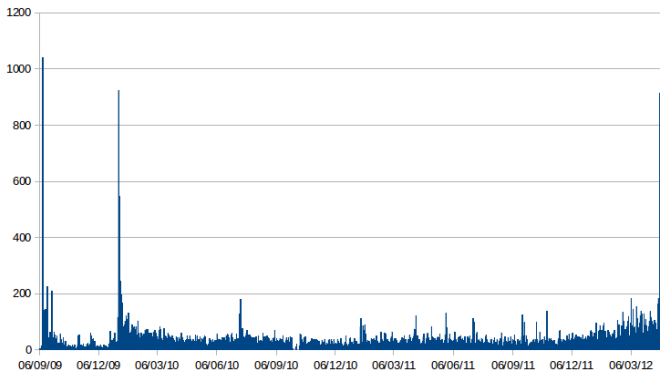
- French
- Dutch
- German
- Spanish
- Brazilian Portuguese
- Russian
- Norwegian Bokmal
- Italian
- Catalan
- Hungarian
- Polish
- Indonesian
- Arabic

Hardware setup



Statistics

- **50000 maps** render since the service has been launched
- **5000 to 10000** visitors per month
- **280 GB** of OSM database



Number of daily maps rendered

Example of usage



City of *Orange, France*, has printed folded maps using MapOSMatic.

Future work

- Allow users to customize the set of amenities and point of interests visible in the index
- Allow users to customize the rendering style. Maybe by exploring the *MapCSS* technology.
- Add a legend and scale on the map.
- Add more translations
- Fix more bugs

Join the project!

- **Website:** <http://www.maposmatic.org>
- **Blog:** <http://news.maposmatic.org>
- **Savannah project:**
<https://savannah.nongnu.org/projects/maposmatic/>
- **Git** repositories
 - OcitySMap: <git://git.savannah.nongnu.org/maposmatic/ocitysmap.git>
 - MapOSMatic: <git://git.savannah.nongnu.org/maposmatic.git>
- **Mailing list:** <https://lists.nongnu.org/mailman/listinfo/maposmatic-dev>
- **IRC channel:** #maposmatic on *Freenode*

Conclusion

- The OSM database and all the tools around it allow a relatively **easy access to geographic data**
- **Very impressive amount of reuse** in this project, thanks to the numerous Python modules available.
- MapOSMatic is, we think, a **good illustration of what is possible thanks to freely available data**
- MapOSMatic is free software, **join us and contribute!**

Questions ?

`http://www.maposmatic.org`

`thomas.petazzoni@enix.org`
`contact@maposmatic.org`