



**Optimized publishing  
*of*  
map and dataservices  
*with*  
GeoServer, GeoStyler,  
GeoWebCache and MapProxy**



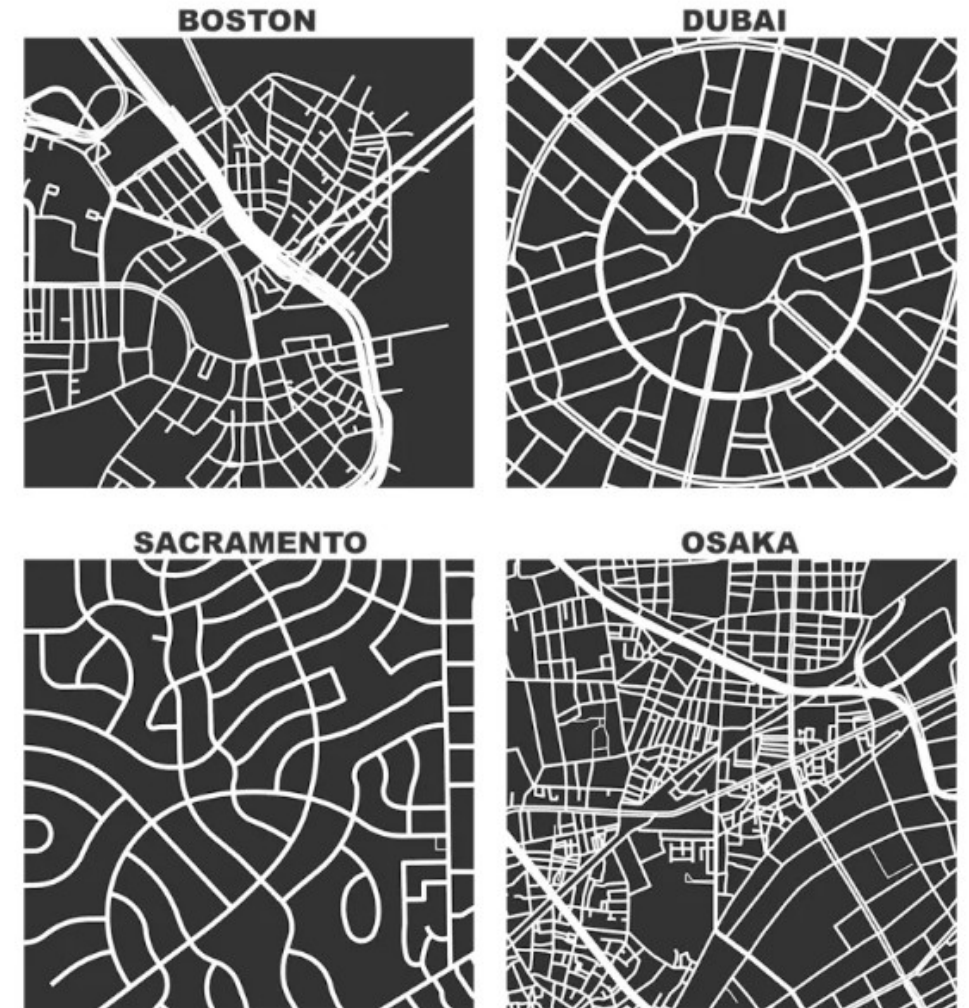
Till Adams and Marc Jansen

June 17th, 2020



# Agenda, *or which road will we take?*

- About
  - the author and the presenter
  - this talk
- Components
- Optimization
  - Style
  - Performance
- Summary / example



<https://geoffboeing.com/2017/01/square-mile-street-network-visualization/>



# About the author and the presenter

# Author



- Till Adams
- [adams@terrestris.de](mailto:adams@terrestris.de)



- Founder of terrestris (2002) and mundialis (2015)
- Chair of global FOSS4G 2016 in Bonn
- OSGeo Board member
- Consultant & agile Coach

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🐦 @tilladams




# Coauthor and presenter



- Marc Jansen, [jansen@terrestris.de](mailto:jansen@terrestris.de)
- General manager of
  - terrestris (01/2018)
  - mundialis (06/2019)
- OSGeo Charter member since 2013
- PSC / Core developer of OpenLayers & GeoExt
- Contributor to GeoStyler, react-geo & other FOSS4G
- ...Developer / technical background
- Now often speaking / teaching FOSS4G

afi



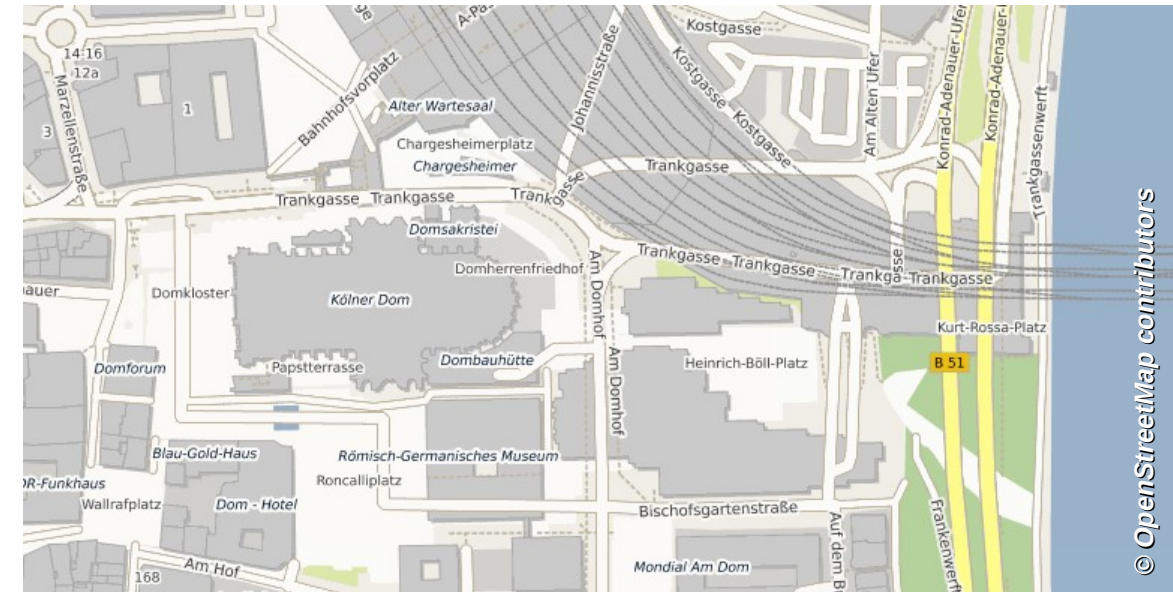
 [jansen@terrestris.de](mailto:jansen@terrestris.de)  
 @marcjansen  
 @selectoid



# terrestris



- <https://terrestris.de/>
- OpenSource GIS company
- Bonn, Germany
- Founded in 2002, nearly grown-up
- Development, Projects & Support/Trainees
- Consulting, Planning, Implementation mostly webbased GIS and Geo-Open Source Software
- OSGeo silver-level sponsor
- providing quite popular free OSM-WMS



*...together with our friends of mundialis*



# About this talk

# Why this talk ... ?



- This talk is for users, not so much for developers
- Thank god: Creation of a simple WMS with Open Source tools is easy today, but ...
  - Styling is *still* a topic
  - Performance is *always* a topic
- We continued to receive many requests on supporting customers in setting up both well designed and fast WMS services in the past months

# Is this the one and only solution?



- No, of course not
- There are many FOSS ways of achieving similar results
- This talk wants to share our experience and provide an insight into how we often solve problems

# Scan the title for buzzw ... components



- Optimized publishing of map and dataservices with



# Scan the title for buzzw ... components



- Optimized publishing of map and dataservices with



# Scan the title for buzzw ... components



- Optimized publishing of map and dataservices with



# Scan the title for buzzw ... components



- Optimized publishing of map and dataservices with







# Components

# GeoServer



- Java-based, OGC compliant Server for Geodata
- Well documented and powerful API
- Widely used in GIS world
- Integrated in many WebGIS frameworks (e.g. SHOGun)

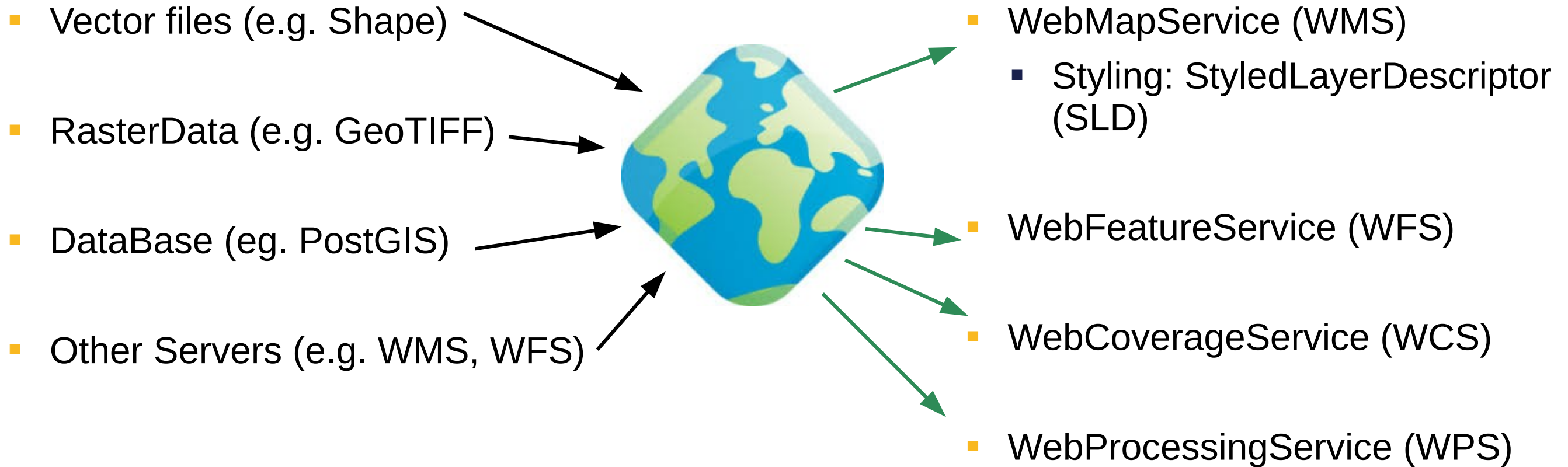


-  [geoserver.org](http://geoserver.org)
-  [github.com/geoserver](https://github.com/geoserver)



**GeoServer**

# GeoServer





Optimized publishing of map and dataservices :

**Ok, you're done**

# GeoServer – Styling Maps



- WebMapService (WMS)
  - Styling: StyledLayerDescriptor (SLD)

Format  
SLD ⓘ Das Format ist schreibgeschützt und nur beim Anlegen änderbar

### Style Content

Generate a default style  
Bitte wä... ▾ [Generate ...](#)

Von einem vorhandenen Stil kopieren  
Bitte wählen ▾ [Kopiere ...](#)

Stildatei  
[Durchsuchen...](#) Keine Datei ausgewählt. [Lade ...](#)

---



Font 12pt ▾ Height 300px ▾

```
1 <StyledLayerDescriptor version="1.0.0" xmlns="http://www.opengis.net/sld" xmlns:ogc="http://
2 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.opengis
3 <NamedLayer>
4 <Name>Shadow Polygon</Name>
5 <UserStyle>
6 <Title>Shadow polygon style</Title>
7 <Abstract></Abstract>
8 <FeatureTypeStyle>
9 <Rule>
10 <Title>Shadow</Title>
11 <MinScaleDenominator>0.0</MinScaleDenominator>
12 <MaxScaleDenominator>10000.0</MaxScaleDenominator>
13 <PolygonSymbolizer>
14 <Geometry>
15 <ogc:Function name="offset">
16 <ogc:PropertyName>geometry</ogc:PropertyName>
17 <ogc:Literal>2.5</ogc:Literal>
18 <ogc:Literal>-2.5</ogc:Literal>
19 </ogc:Function>
20 </Geometry>
21 <Fill>
22 <CssParameter name="fill">#B5B5B5</CssParameter>
23 </Fill>
24 </PolygonSymbolizer>
</TextSymbolizer>
```

[Validieren](#) [Apply](#) [Speichern](#) [Abbrechen](#)

# GeoStyler



- Ready-to-use map styling library
- Read & write of various style formats
- Read of various data formats
- Development & integration of own parsers
- Support for raster data
-  [geostyler.org](https://geostyler.org)
-  [github.com/geostyler](https://github.com/geostyler)



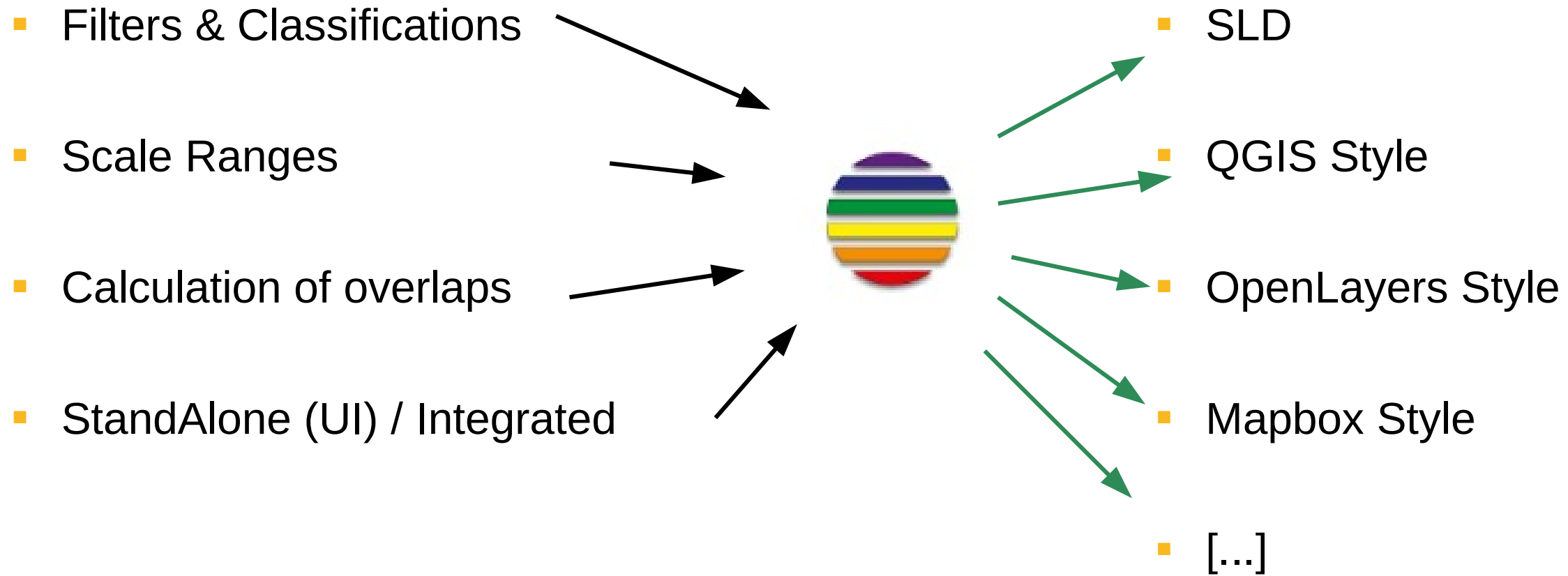
## Existing parsers

**Data** WFS, GeoJSON & Shapefile

**Style** SLD, QGIS, Mapbox & OpenLayers

**In development:** MapServer Styles,  
GeoPackage, more i18n





## User Interface Elements (UI)

Symbolizer Editor

0 Add

Kind: Mark

Symbol: Circle

Radius: 5

Fill-Color: Change

Fill-Opacity: 1.00

Stroke-Color: Change

Stroke-Width: 2

Stroke-Opacity: 1.00

Rotation: 0

Symbol: Triangle

Filter Editor

AND

GEN (string) != Hamburg

pop (number) < 10000000

OR

dense (number) > 10

dense (number) < 10000

Code Editor

Format: SLD Style Parser

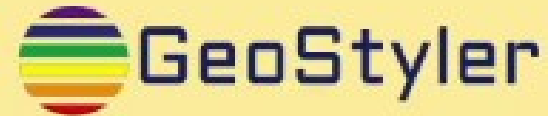
```
1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <StyledLayerDescriptor version="1.0.0"
  xsi:schemaLocation="http://www.opengis.net/sld
  StyledLayerDescriptor.xsd" xmlns="http://www.opengis.net/sld"
  xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3   <NamedLayer>
4     <Name>Demo Style</Name>
5     <UserStyle>
6       <Name>Demo Style</Name>
7       <Title>Demo Style</Title>
8       <FeatureTypeStyle>
9         <Rule>
10          <Name>Rule 1</Name>
11          <PointSymbolizer>
12            <Graphic>
13              <Mark>
14                <WellKnownName>circle</WellKnownName>
15                <Fill>
16                  <CssParameter name="fill">#1b0978</CssParameter>
17                </Fill>
18                <Stroke>
19                  <CssParameter name="stroke">#03010e</CssParameter>
20                  <CssParameter name="stroke-width">2</CssParameter>
21                  <CssParameter name="stroke-opacity">1</CssParameter>
22                </Stroke>
23              </Mark>
```

Copy to Clipboard Save as File

# GeoStyler – Standalone



Docs



Language:    Compact:  Symbolizer Renderer:   Load Style:

Load Data:

## Graphical Editor

Name:

<input checked="" type="checkbox"/>		Name	Filter	Min. Scale	Max. Scale	Σ	
<input checked="" type="checkbox"/>	<input type="button" value="^"/> <input type="button" value="v"/>	679000 - 2071000	pop >= '679000' AND			4	0
<input checked="" type="checkbox"/>	<input type="button" value="^"/> <input type="button" value="v"/>	2071000 - 3228500	pop >= '2071000' AND			4	0
<input checked="" type="checkbox"/>	<input type="button" value="^"/> <input type="button" value="v"/>	3228500 - 6646250	pop >= '3228500' AND			4	0
<input checked="" type="checkbox"/>	<input type="button" value="^"/> <input type="button" value="v"/>	6646250 - 17890000	pop >= '6646250' AND			4	0





# GeoServer

GeoServer 2.16.x User Manual » Community modules » GeoStyler Extension

## GeoStyler Extension

This plugin gives an extra tab in the style editor with a graphical style editor.

The [GeoStyler](#) is a set of JavaScript packages that can be used to edit styles.

When editing a style in the GeoStyler the SLD code editor is automatically opened. You can edit the style and then apply/save it as usual.

If you run into trouble using the GeoStyler module or have some suggestions, please contact the [GeoStyler repository](#).

- [Installing the GeoStyler extension](#)

Previous: [MapML](#)

### Style Editor - tiger\_roads

Edit the current style. The editor can provide syntax highlighting and automatic formatting. Click on the "validate" button to verify the style is a valid SLD document.

Data Publishing Layer Preview Layer Attributes **GeoStyler**

Preview on layer: tiger.tiger\_roads

Name:

<input type="checkbox"/>		Name	Filter	Min. Scale	Max. Scale
<input type="checkbox"/>	^ v			1:32000	
<input type="checkbox"/>	^ v				1:32000
<input type="checkbox"/>	^ v				1:32000
<input type="checkbox"/>	^ v	apple Fea			1:32000

+ Add Rule Clone Rules - Remove Rules Multi edit

```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <StyledLayerDescriptor version="1.0.0"
3   xsi:schemaLocation="http://www.opengis.net/sld StyledLayerDescriptor.xsd"
4   xmlns="http://www.opengis.net/sld" xmlns:ogc="http://www.opengis.net/ogc"
5   xmlns:xlink="http://www.w3.org/1999/xlink"
6   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
7 <NamedLayer> <Name> area landmarks </Name>
8 <UserStyle>
9   <FeatureTypeStyle>
10     <FeatureTypeName>Feature</FeatureTypeName>
11     <Rule>
12       <MinScaleDenominator>32000</MinScaleDenominator>
13       <LineSymbolizer>
14         <Stroke>
15           <CssParameter name="stroke">
16             <ogc:Literal>#666666</ogc:Literal>
17           </CssParameter>
18           <CssParameter name="stroke-width">
19             <ogc:Literal>2</ogc:Literal>
20           </CssParameter>
21         </Stroke>
22       </LineSymbolizer>
23     </Rule>
24   </FeatureTypeStyle>
25 </UserStyle>
26 </NamedLayer>
  
```

Validate Apply Submit Cancel



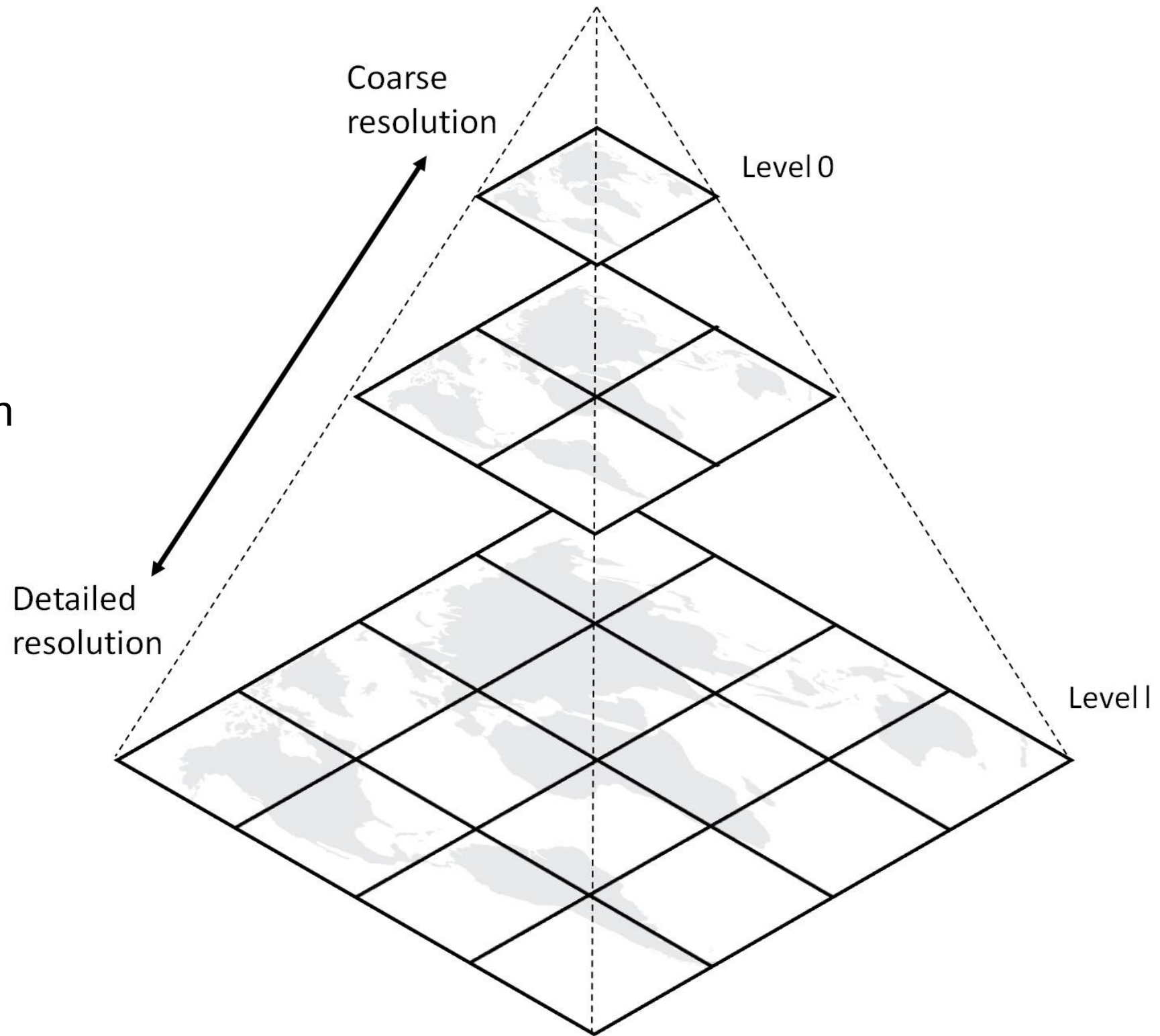
~~Optimized~~ publishing of map and dataservices:

**But now, you're done ..?**

# Caching Maps





- Clever if...
  - data doesn't change too often
  - many requests
  - many layers (e.g. grouped layers)
  - performance problems
  - restricted hardware for WMS Server



# GeoWebCache



- Java-based tiling server (caching application)
  - Sources: WMS
  - Interfaces: WMS-C, WMTS, TMS, Google Maps KML, Virtual Earth
- Well documented and powerful API
- Integrated in GeoServer
  
-  [geowebcache.org](http://geowebcache.org)
-  [github.com/geowebcache](https://github.com/geowebcache)



# GeoWebCache



<https://www.geowebcache.org>





# MapProxy



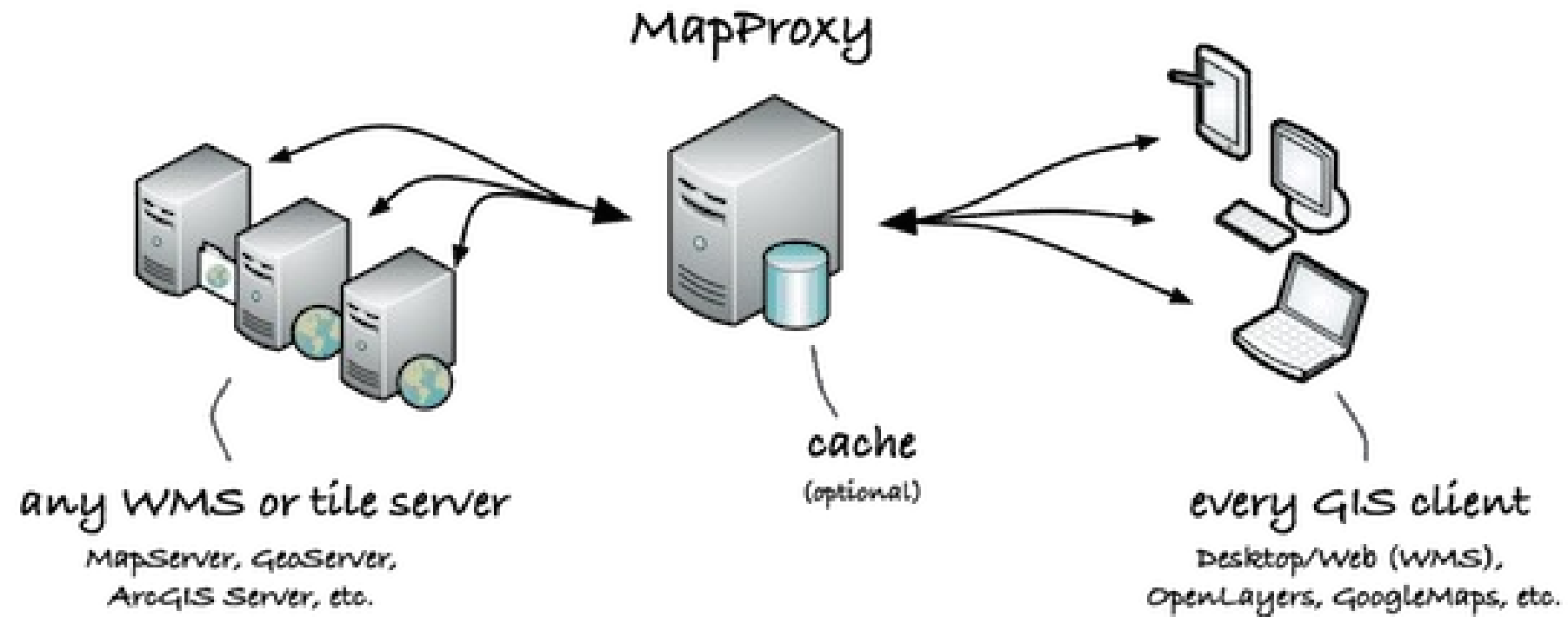
- Proxy for geospatial data (Caching engine)
  - Sources: WMS, WMTS, Mapserver, Mapnik, Tilecache  
GoogleMaps, BingMaps, ArcGIS REST
  - Interfaces: WMS-C, TMS, WMTS, KML SuperOverlays
- Well documented and powerful API



-  [mapproxy.org](http://mapproxy.org)
-  [github.com/mapproxy](https://github.com/mapproxy)



# MapProxy



<https://www.mapproxy.de>

# cool functions of MapProxy



- MapProxy is capable to
  - auto-generate grey version of cache  
(in general: manipulate color channels)
  - re-project tiles (= one cache for several EPSG's)
  - interpolate tiles between cached zoom levels
  - Reads a lot of input data
  - Optimized storage
  - Security for layers or regions  
(link to existing user-database or SSO)



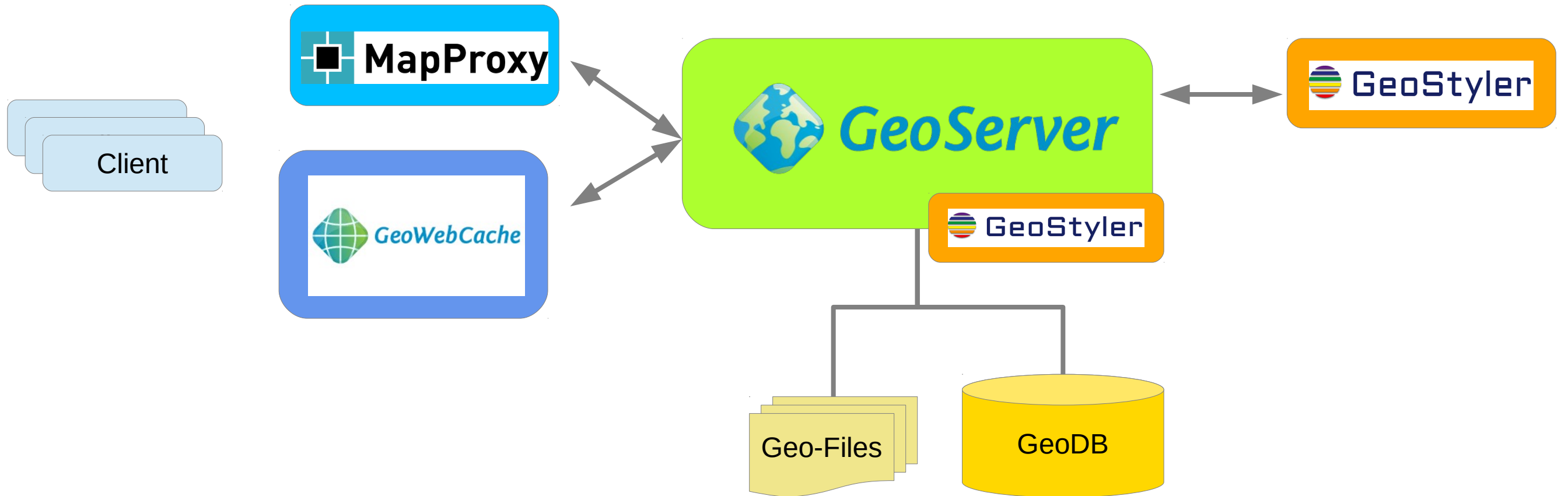
# GWC & MapProxy



## Summary

- GeoWebCache is built-in GeoServer (& standalone), the entry barrier is basically non-existing
- GeoWebCache: one cache per EPSG-code – MapProxy: same cache for all, if wanted
- MapProxy is able to *replace* the service behind by cache-interpolation
  - MapProxy interpolates tiles if request is between zoom levels
  - GeoWebCache sends request to GeoServer
- GeoWebCache WMS needs parameter “tiled=true”

# Architecture: Optimized publishing of map and dataservices





Optimized publishing of map and dataservices :

**Now, you're done ..!**

one example ....: <https://ows.terrestris.de>

# Summary



- Open Source is combinable!
- There is often more than one component to reach your goal
- The presented architecture has already proven its suitability for setting up good-looking, fast and robust MapServices, as the example OpenStreetMap WMS shows

# Questions? *Please reach out and/or participate!*



geostyler / geostyler

Used by 8 Unwatch 17 Unstar 58 Fork 20

Code Issues 51 Pull requests 8 Actions Projects 13 Wiki Security 1 Insights Settings

### Add locale zh-CN #1286

Edit Open with

Merged jansule merged 2 commits into geostyler:master from initialdmg:locale-zh-CN 6 hours ago

Conversation 8 Commits 2 Checks 0 Files changed 1 +336 -0

initialdmg commented 2 days ago

**Thank you** ❤️

Thank you for considering giving code and/or documentation back to this project, you're awesome and we appreciate your work.

#### Some guidelines for the proposed change

Please review the [guidelines for contributing](#) and the [code of conduct](#) of this repository. This makes it easy for you to give back and for us to accept your changes.

Reviewers

- afi marcjansen ✓
- chrismayer ✓
- jansule ✓

Assignees

No one—assign yourself

Labels

None yet

**Thank you!**

**Till Adams**  
**adams@terrestris.de**

**Marc Jansen**  
**jansen@terrestris.de**

Be like @initialdmg and give back: <https://github.com/geostyler/geostyler/pull/1286>