

Geographic Interfaces

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Web Mapping APIs

- maps are big
- users want responsive web applications

Give them what they want.

The Basics

The world is round. A map is not.





Arctic Ocean

Arctic Ocean

Greenland

Iceland

Canada

United States

North Pacific Ocean

North Atlantic Ocean

México

Venezuela

Colombia

Brasil

Brazil

Perú

Bolivia

Chile

Argentina

South Pacific Ocean

South Atlantic Ocean

Southern Ocean

Southern Ocean

Antarctica

Россия

Russia

United Kingdom

Polka

Deutschland

Germany

France

España

Spain

Italia

Italy

Algeria

Libya

مصر

Egypt

Mauritania

Mali

Niger

Nigeria

Chad

Sudan

Ethiopia

DR Congo

Angola

Namibia

Botswana

South Africa

Suomi

Finland

Sverige

Sweden

Norge

Norway

Polka

Poland

Україна

Ukraine

Türkiye

Turkey

Iraq

Iran

Afghanistan

Pakistan

Saudi Arabia

India

Kenya

Tanzania

Madagascar

South Africa

Kazakhstan

Mongolia

中国

China

대한민국

S Korea

日本

Japan

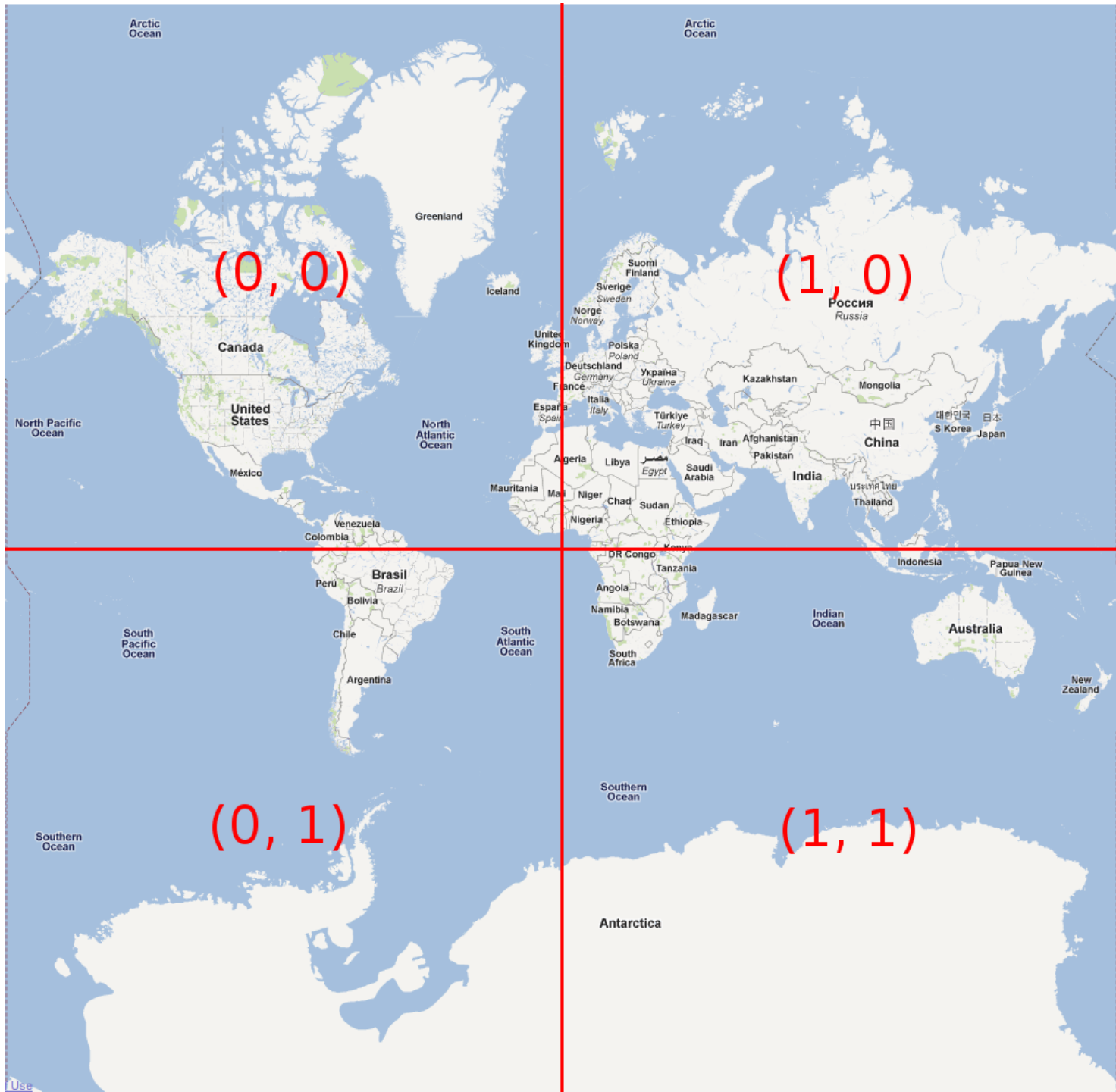
Thailand

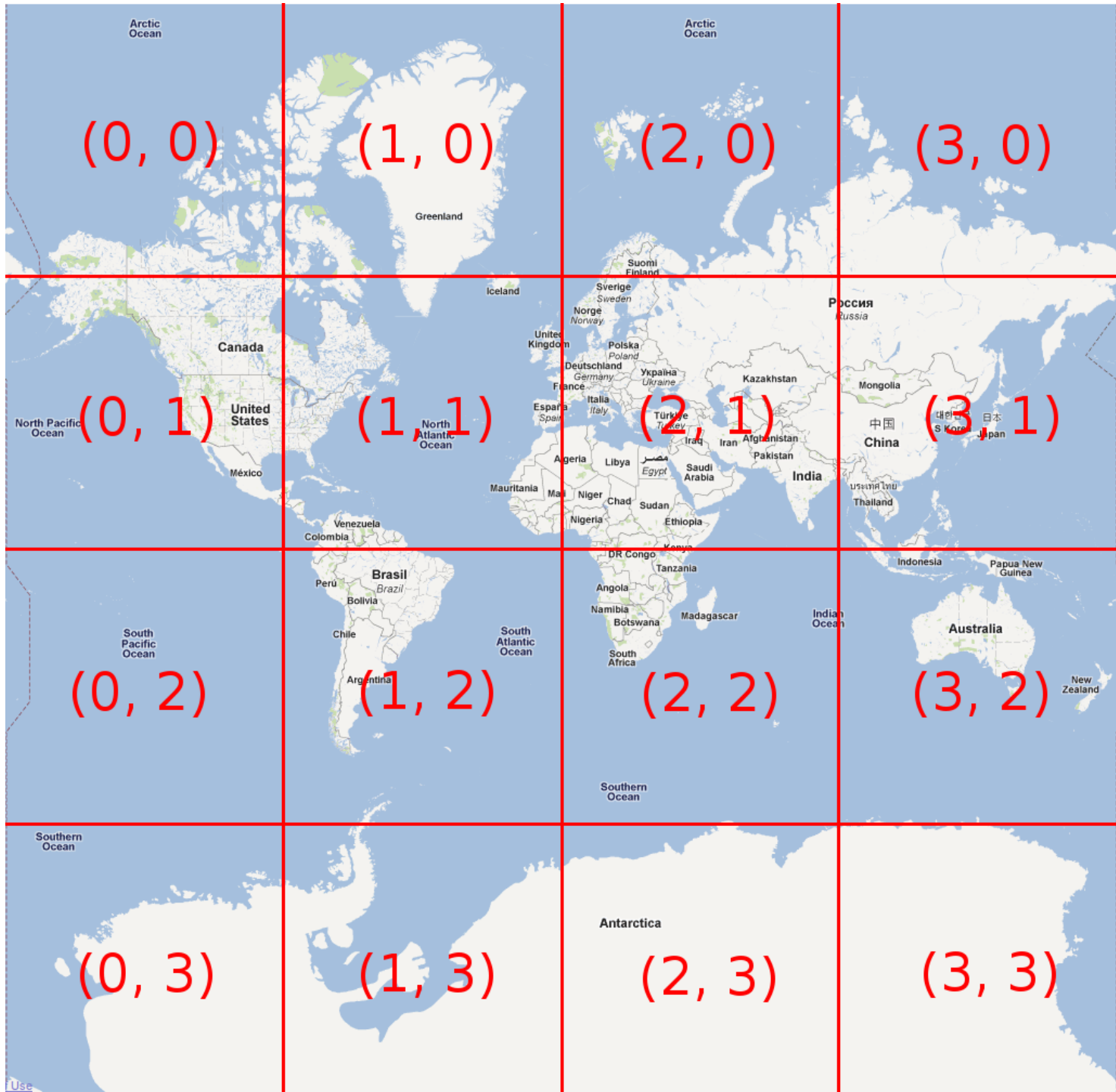
Indonesia

Papua New Guinea

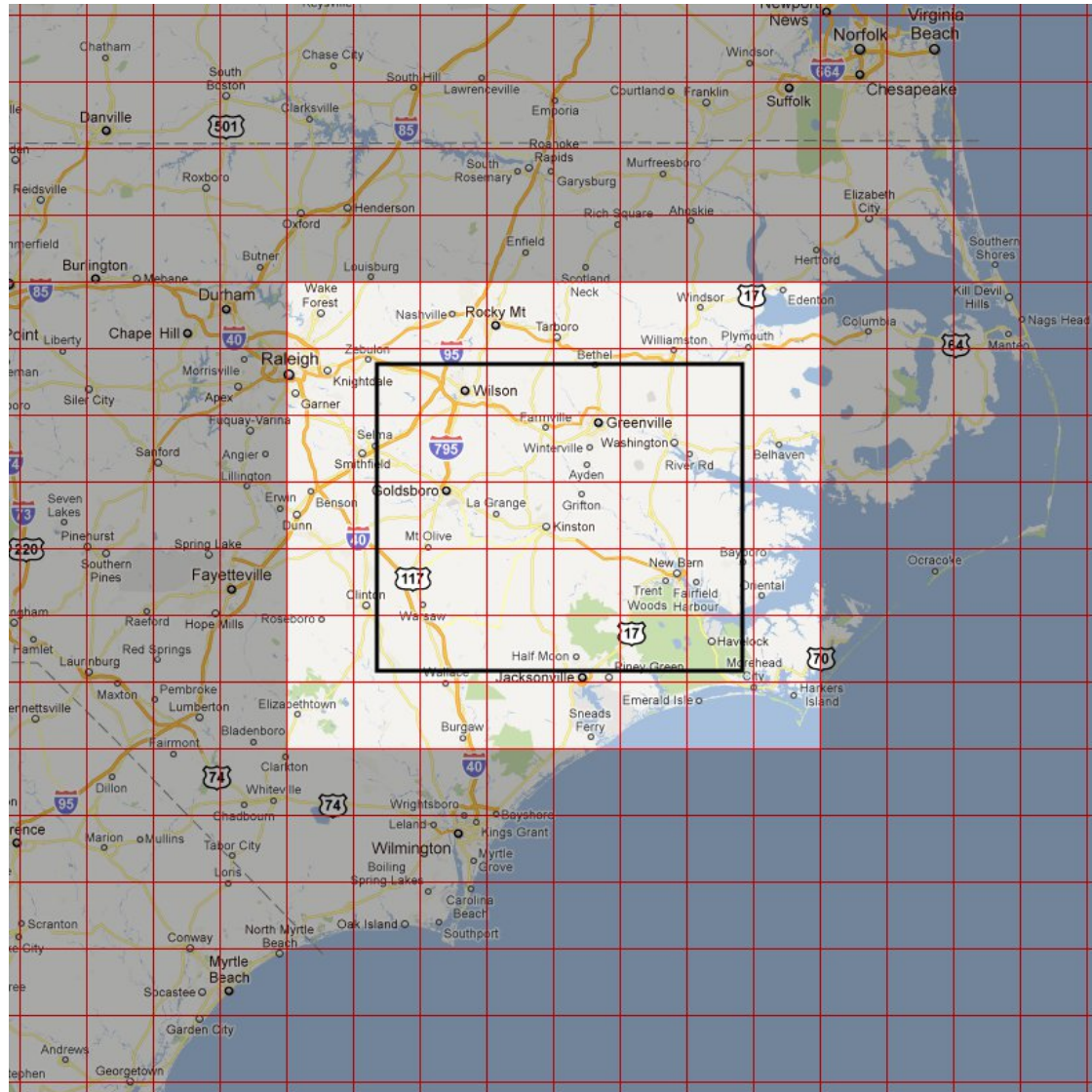
Australia

New Zealand



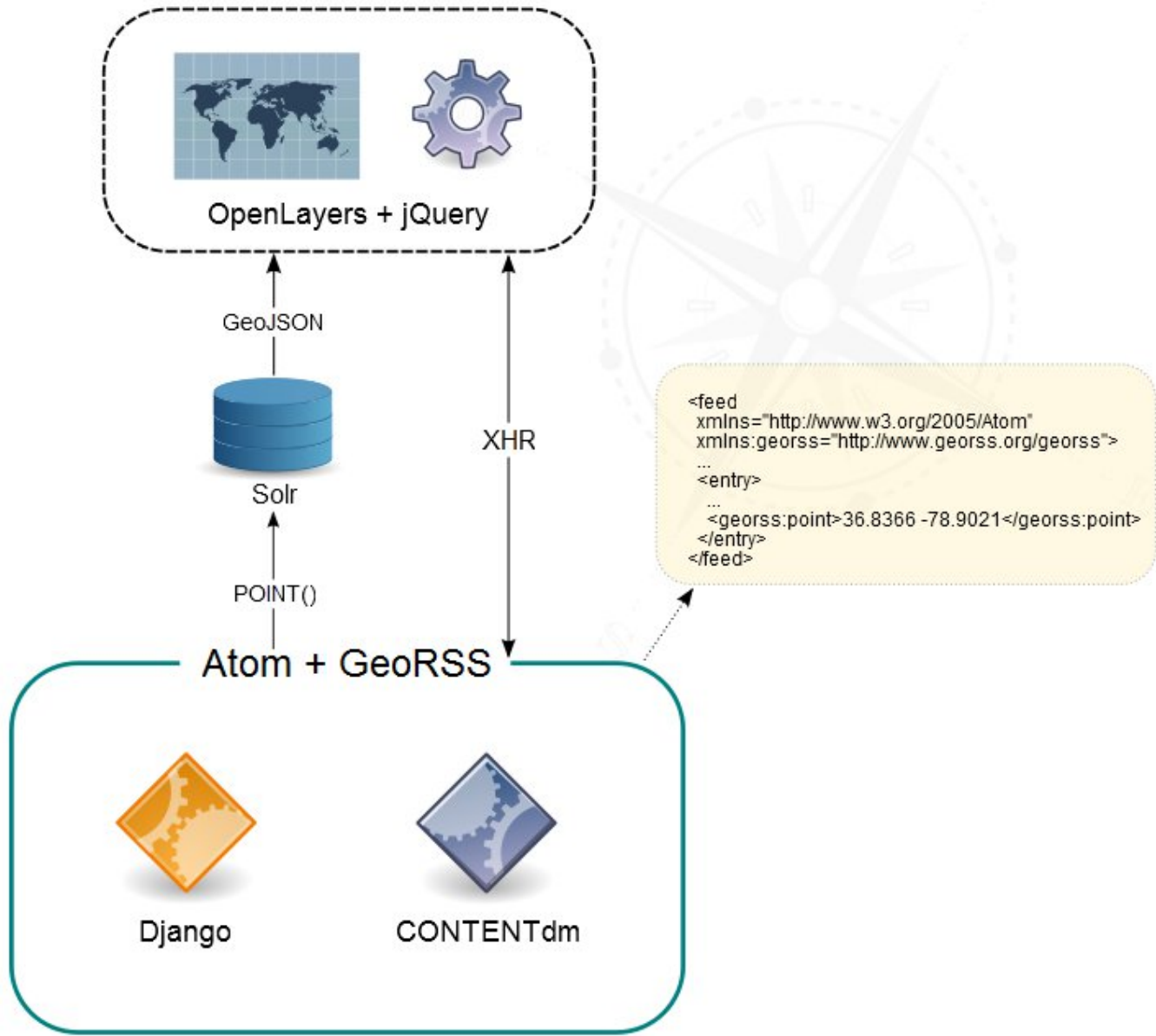


Tile ↔ pixel ↔ spherical mercator coordinate ↔ latitude/longitude

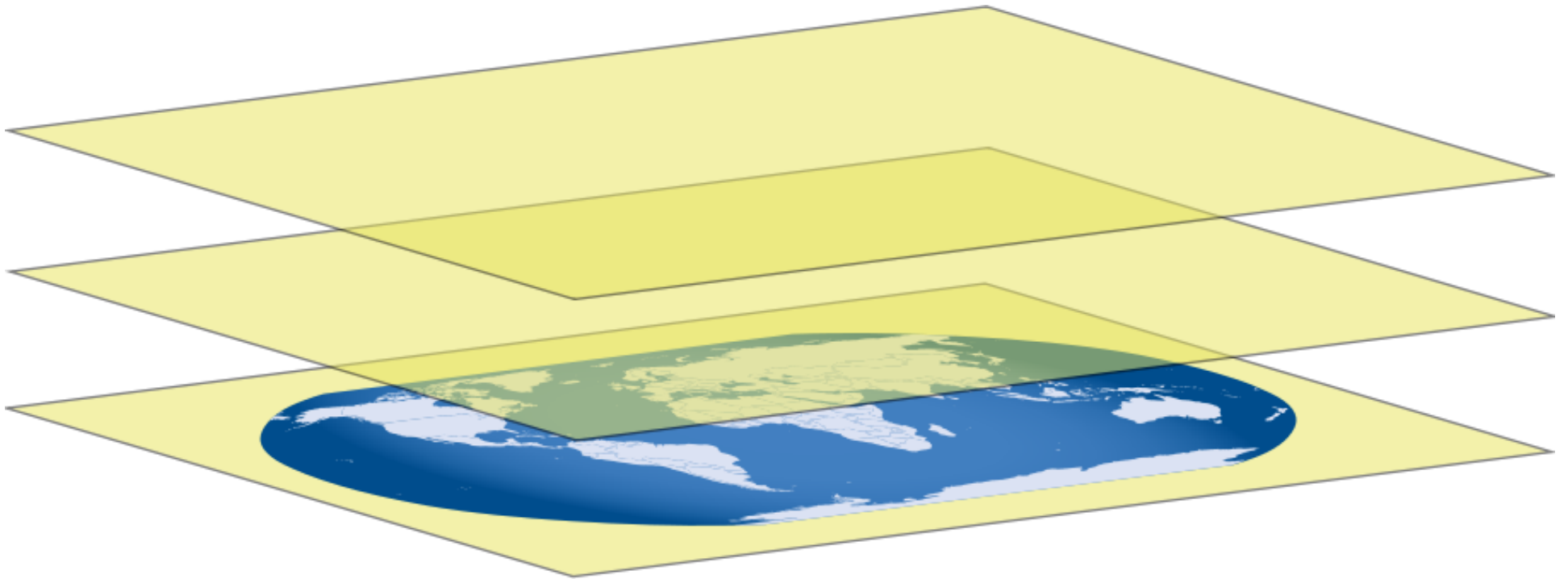


Geobrowse

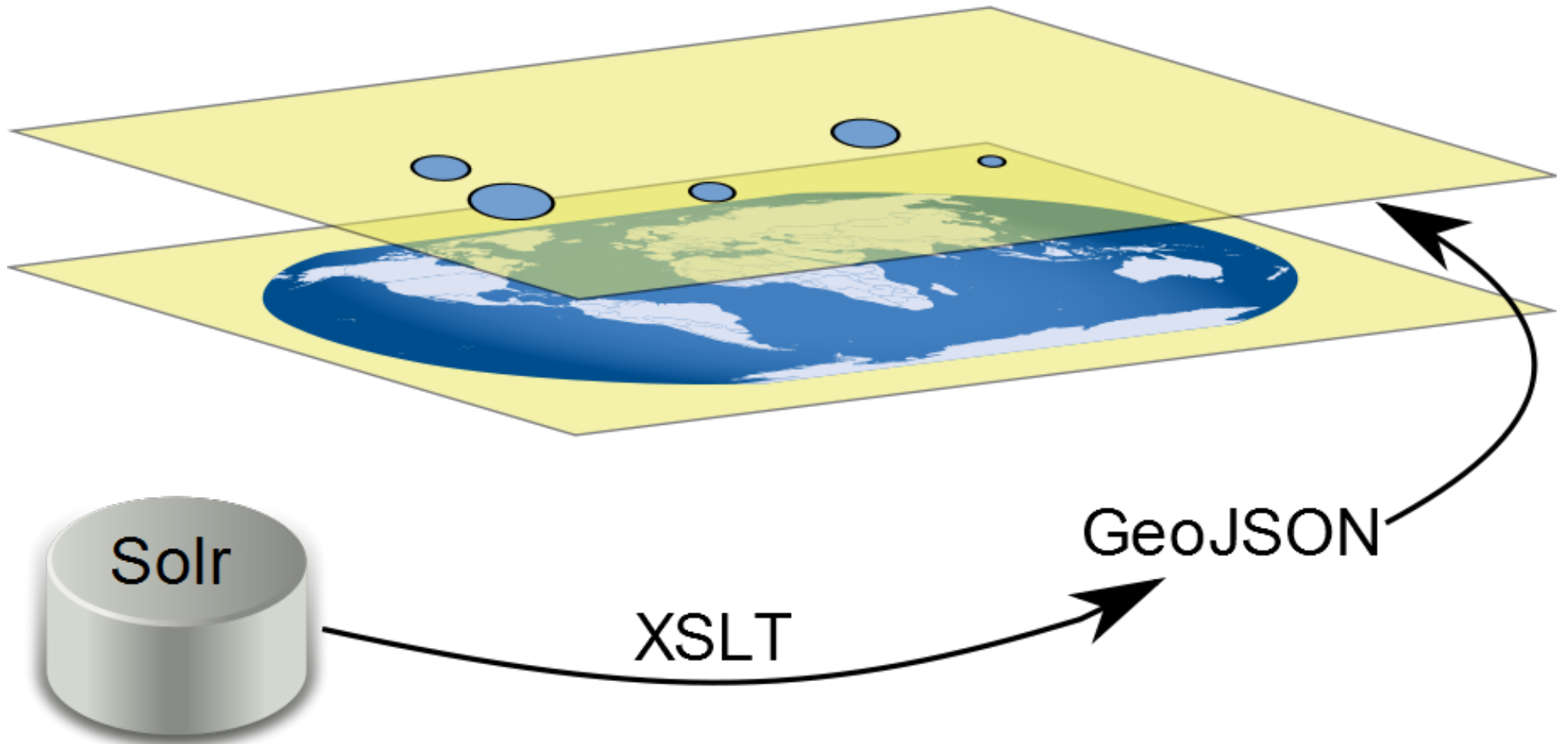
<http://www.lib.unc.edu/dc/geobrowse/>



OpenLayers



Geobrowse + OpenLayers

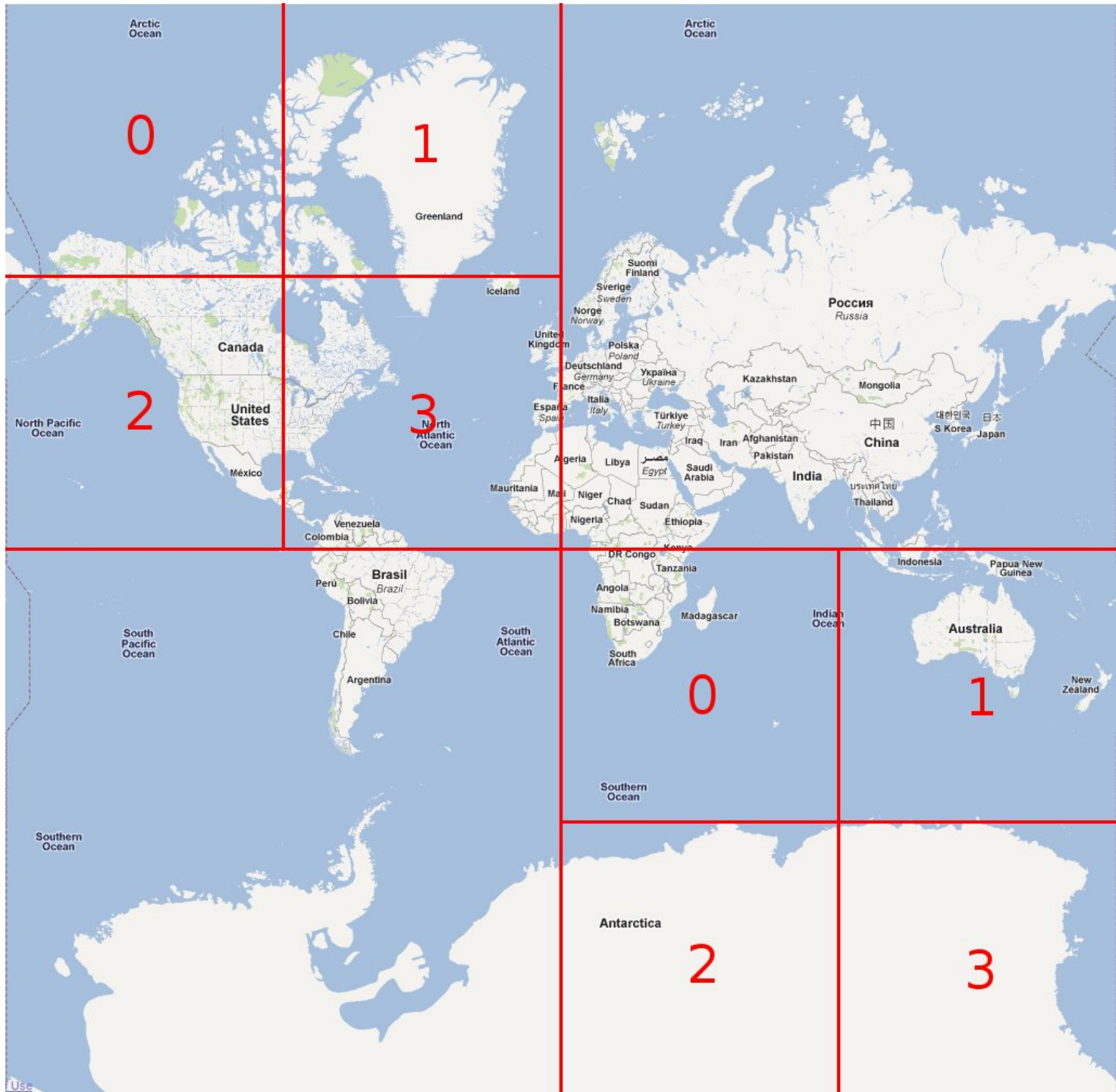


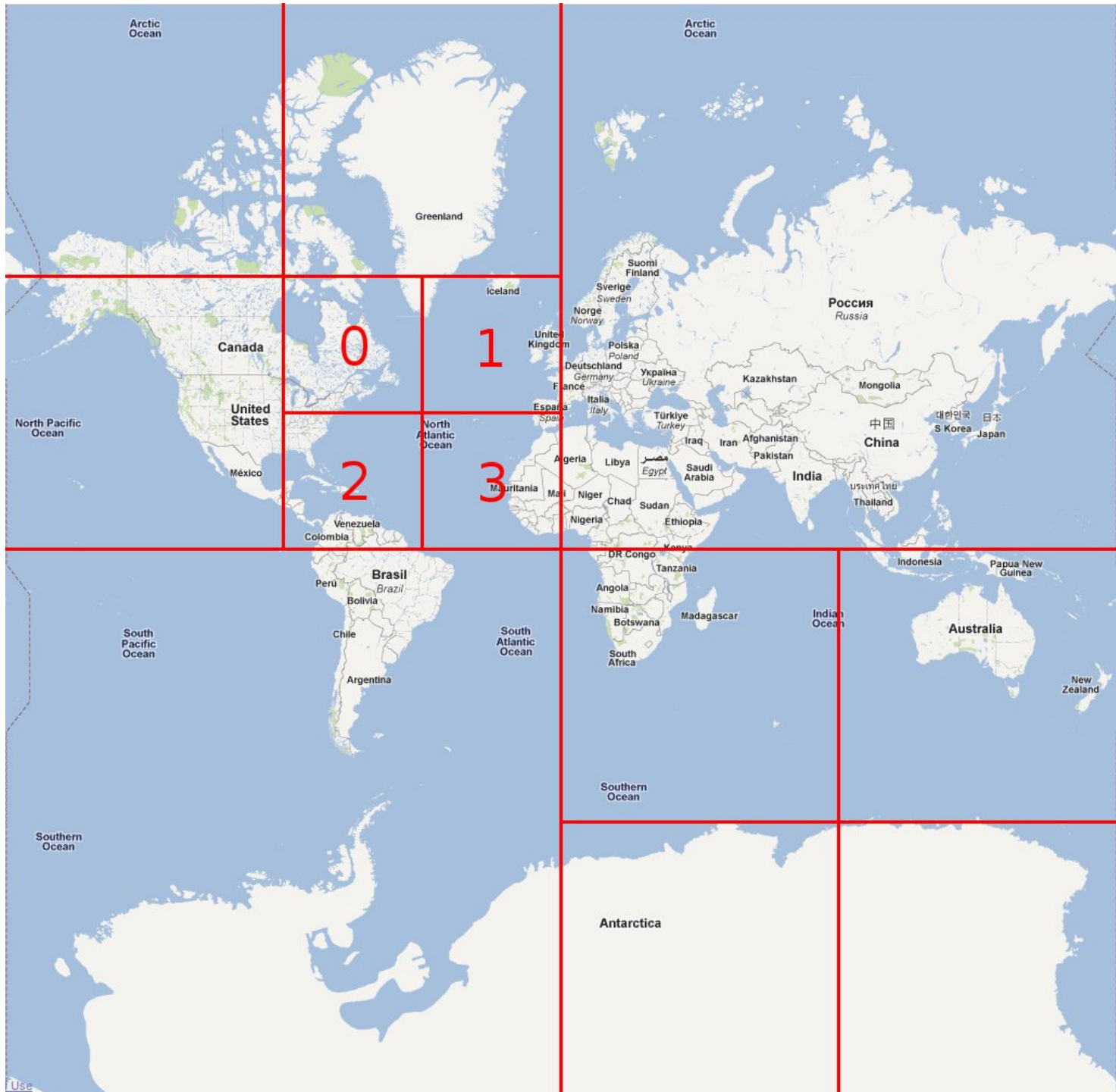
Too Many Points

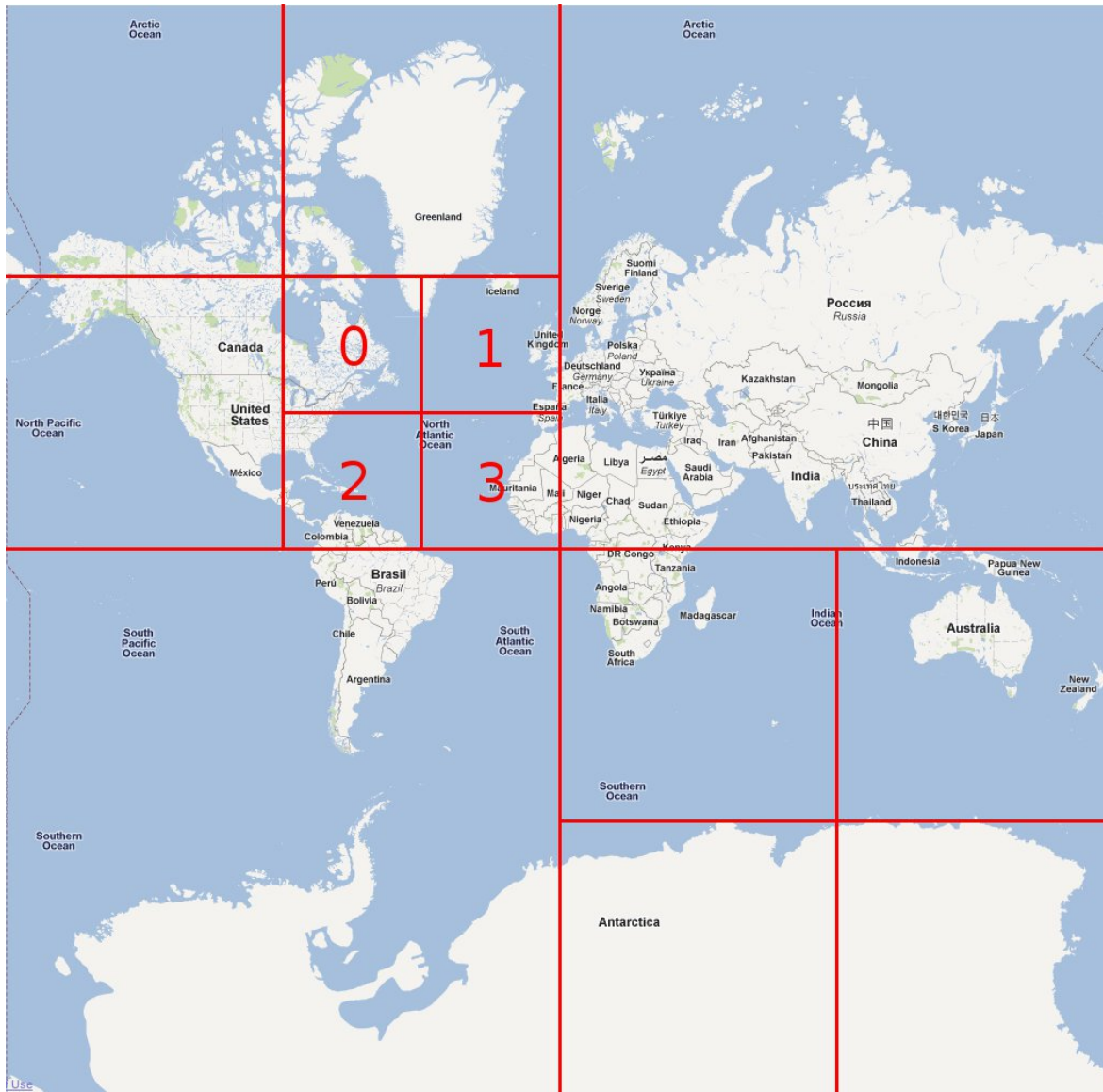
Moving clustering to the server has two big complications:

1. clustering is usually a pretty computationally expensive operation
2. clusters need to be identifiable and consistent









North Carolina
032

NC = 032

0 3 2

00 11 10

Latitude: 011

Longitude: 010

Latitude Bit	Center Point	Margin of Error
0	45	+/- 45 degrees
1	22.5	+/- 22.5 degrees
1	11.25	+/- 11.25 degrees

How does this help us?

0	1	0	3	2	0	3
0	1	0	1	2	2	1
0	1	1	1	2	1	3
0	1	3	3	1	2	2

1	2	3	4	5	6	7
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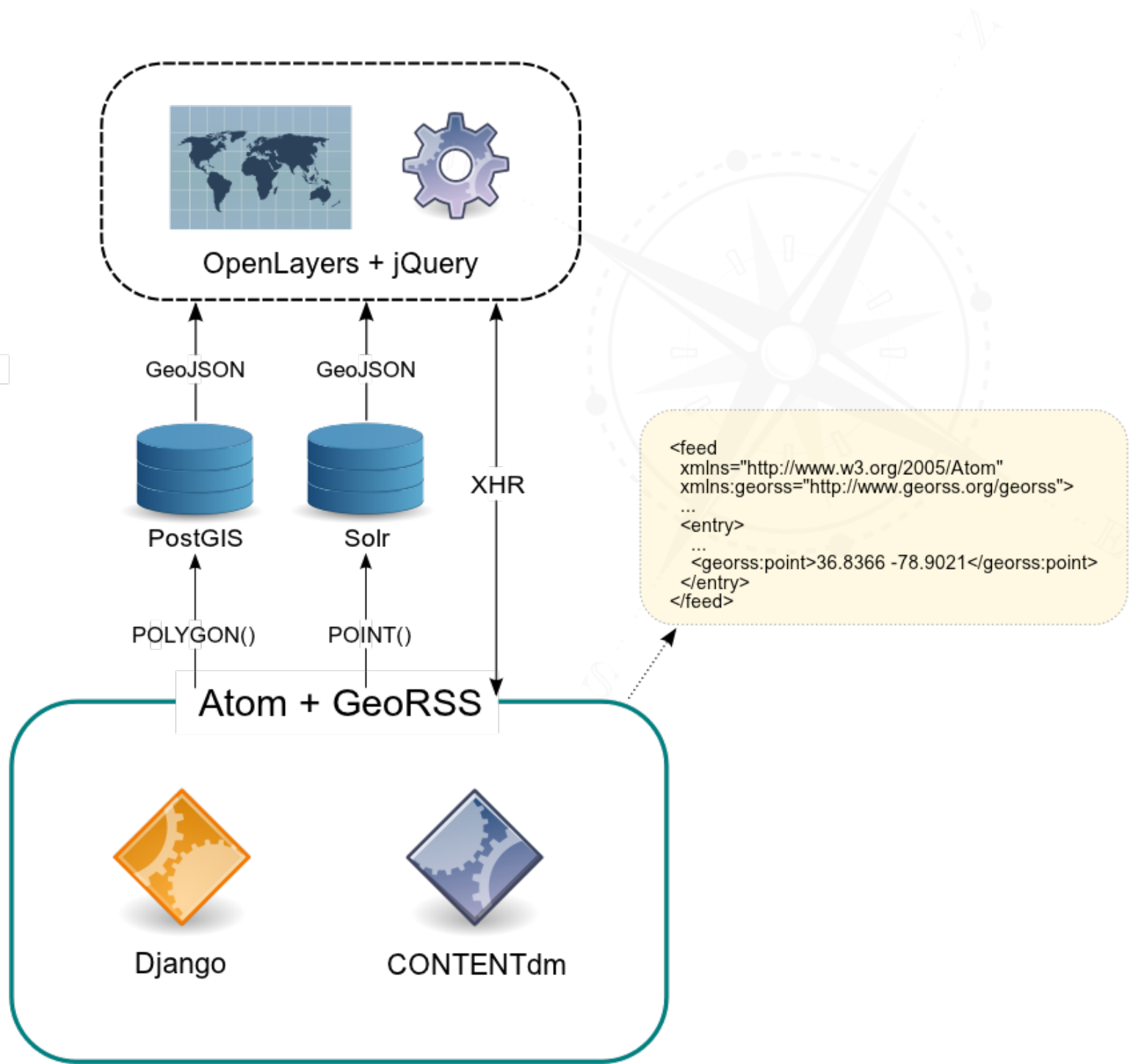
Zoom Levels

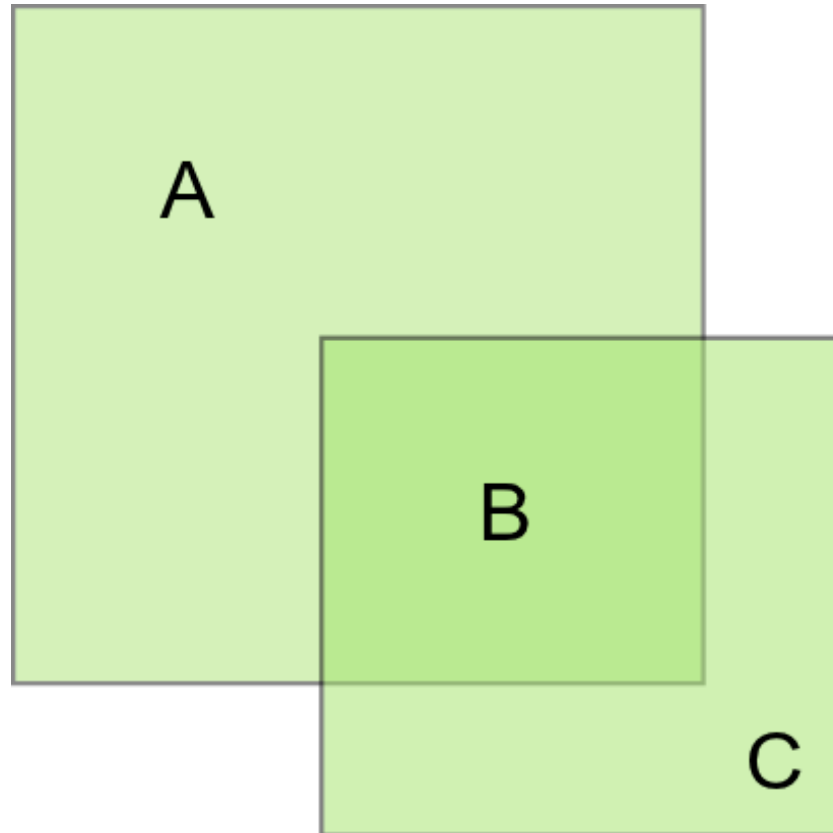
Advantages of Quadtree Clustering

- clustering is mostly done at index time
- clustering is deterministic

Geosearch

<http://dc.lib.unc.edu/ncmaps/search.php>





Overlaps: $100 * \text{Area}(\text{Intersection}(P_{\text{map}}, P_{\text{search}})) / \text{Area}(\text{Union}(P_{\text{map}}, P_{\text{search}}))$

Within: $100 * \text{Area}(P_{\text{map}}) / \text{Area}(P_{\text{search}})$

What's Next?

- browse polygons
- linked data (<http://www.geonames.org/>)
- more data